```
1                               .TITLE CZMLADO ML-11 LOGIC TEST
          .SBTTL USER DOCUMENTATION
                                                        .REM &
```

IDENTIFICATION

PRODUCT CODE:	AC-S388D-MC
PRODUCT NAME:	CZMLADO ML11 LOGIC TEST
PRODUCT DATE:	19-MAR-82
MAINTAINER:	MEMORY DIAGNOSTIC ENGINEERING
AUTHOR:	D.W. NEALE

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TABLE OF CONTENTS

1.0 GENERAL INFORMATION
1.1 PROGRAM ABSTRACT
1.2 SYSTEM REQUIREMENTS
1.3 RELATED DOCUMENTS AND STANDARDS
1.4 ASSUMPTIONS

2.0 OPERATING INSTRUCTIONS
2.1 COMMANDS
2.2 SWITCHES
2.3 FLAGS
2.4 HARDWARE QUESTIONS
2.5 SOFTWARE QUESTIONS
2.6 EXTENDED P-TABLE DIALOGUE
2.7 QUICK STARTUP PROCEDURE

3.0 ERROR INFORMATION

4.0 PERFORMANCE AND PROGRESS REPORTS

5.0 DEVICE INFORMATION TABLES

6.0 TEST SUMMARIES

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

DIAGNOSTIC ENGINEERING WAS CONTRACTED BY MEMORY ENGINEERING TO MAKE THIS DIAGNOSTIC IN ORDER TO AID MEMORY ENGINEERING TO DESIGN AND DEBUG THE ML-11, AID FIELD SERVICE FOR FIELD REPAIRS AND INSTALLATIONS THE ML-11.

THIS DIAGNOSTIC PRODUCT WILL BE DESIGNED TO TEST FROM ONE TO EIGHT ML-11A OR ML-11B UNITS OFF A SINGLE RH11 OR RH70 CONTROLLER.

THE FUNCTIONAL LEVEL (FRU) OF THIS DIAGNOSTIC PRODUCT WILL BE TO THE LOGIC FUNCTION LEVEL. UPON DETECTION OF AN ERROR BY THE DIAGNOSTIC, THE LOGIC FUNCTION AND RESPECTIVE MODULE WHICH IT IS LOCATED ON WILL BE PRINTED TO THE OPERATOR.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT.

THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

PDP-11 WITH MINIMUM OF 28K WORDS OF MEMORY

CONSOLE TERMINAL

RH11 OR RH70

1 TO 8 ML-11A OR ML-11B DRIVES ON INTERMIXED BUS

XXDP+ LOAD MEDIA

1.3 RELATED DOCUMENTS AND STANDARDS

1. SUPPRGC.DOC
2. SUPINT.MEN
3. SUPFUN.C
4. XXDPPLUS.DOC
5. BLISS LANGUAGE GUIDE
6. BLISS-16 USER'S GUIDE

1.4 ASSUMPTIONS

IT WILL BE ASSUMED THAT PRIOR TO THE RUNNING OF THIS DIAGNOSTIC THAT ALL APPROPRIATE CPU, MAIN MEMORY AND RH CONTROLLER DIAGNOSTICS HAVE BEEN SUCCESSFULLY RUN.

THIS DIAGNOSTIC WILL HOWEVER PERFORM MINIMAL RH TESTS TO ENSURE ITS EXISTANCE AND BASIC FUNCTIONALITY BEFORE LOGIC TESTS ARE ALLOWED TO RUN.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)
DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
ZFLAGS	CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE "STA" INSTEAD OF "START".

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY "DDDDD".

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 1 TO 64000)

/UNITS:LIST TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

START/TESTS:1-5/PASS:1000/EOP:100

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
PRINT					
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS, NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBE*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXE*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	"BELL" ON ERROR

UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
IDU	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST
EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1

SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE, TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS AND TYPE A "BELL" ON ERROR, YOU MAY USE THE FOLLOWING STRING:

```
/FLAGS:LOE:IER:BOE
```

2.4 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING QUESTIONS FOR EACH UNIT.

PARAMETER CODING CALLS

```
GPRMA   MSGH1,0,0,0,177777,YES          ;RH ADDRESS
GPRMD   MSGH2,2,0,77,11,70,YES          ;RH TYPE
GPRMD   MSGH3,4,0,777,0,777,YES         ;RH VECTOR ADDRESS
GPRMD   MSGH4,6,0,77,1,16.,YES          ;NUMBER OF ARRAYS
GPRML   MSGH5,10,1,YES                  ;DRIVE OPTION TYPE
GPRMD   MSGH6,12,0,7,0,7,YES            ;DRIVE NUMBER
GPRML   MSGH7,14,1,YES                  ;PARITY DISABLED
```

PARAMETER CODING MESSAGES

```
MSGH1:  .ASCIZ  /RH ADDRESS?/
MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
MSGH7:  .ASCIZ  /IS PARITY DISABLED?/
```

SAMPLE DIALOGE

```
DR> S/A  <CR>
```

```
CHANGE HW <L>  ?  Y  <CR>

# UNITS <D>  ? 1  <CR>

UNIT 0
RH ADDRESS <O> 176400  ?  <CR>
IS RH AN '70' OR '11' <O>  ?  <CR>
RH VECTOR ADDRESS <O>  204  ?  <CR>
NUMBER OF ARRAYS MODULES  ? <D>  16  ?  14  <CR>
IS DRIVE OPTION AN ML11A ? <L>  Y  ?  <CR>
ML-11 DRIVE NUMBER ? <O>  0  ?  <CR>
IS PARITY DISABLED ? <L>  N  ?  <CR>
```

2.5 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING "Y".

THE FOLLOWING OPTIONS ARE AVAILABLE FOR OPERATOR SELECTION:

1. ENABLE PRINTING OF DRIVE SERIAL NUMBERS.
2. LIMIT THE NUMBER OF ERRORS PRINTED PER EACH DETECTED ERROR. A MAXIMUM OF 10 ERRORS WILL BE PRINTED PER ERROR BEFORE THE ERROR IS EXITED.
3. ENABLE RH AND ML11 REGISTER DUMP ON ERRORS.
4. ABORTING PROGRAM EXECUTION AFTER ONE COMPLETE PASS.
5. ENABLE MANUAL INTERVENTION TESTS.

2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 2
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  1<CR>
Q-FACTOR (O) 1 ?  0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 4
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  3<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 5
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  4<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 6
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  5<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 8
CSR ADDRESS (O)  160000<CR>
SUB-DEVICE # (O) ?  7<CR>
Q-FACTOR (O) 1 ?  <CR>
```

NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING MULTIPLE UNITS!

AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER. LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION FEATURE.

```
# UNITS (D) ?  8<CR>
```

```
UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0,1<CR>
Q-FACTOR (O) 0 ?  1,0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2-5<CR>
Q-FACTOR (O) 0 ?  0<CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6,7<CR>
Q-FACTOR (O) 0 ?  1<CR>
```

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS SHOWN BELOW.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0-7<CR>
Q-FACTOR (O) 0 ?  0,1,0,,,,1,1<CR>
```

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE
3. TYPE "R CZMLA"
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"

6. ANSWER ALL THE HARDWARE QUESTIONS

7. ANSWER THE "CHANGE SW" QUESTION WITH 'N"

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE "IER" FLAG IS SET (SECTION 2.3). THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
NAME  TYPE  NUMBER  ON UNIT NUMBER  TST NUMBER PC:XXXXXX
ERROR MESSAGE
```

,WHERE; NAME = DIAGNOSTIC NAME
TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
NUMBER = ERROR NUMBER
UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE "IER" OR "IBR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE "IER", "IBR" OR "IXR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

3.2 SPECIFIC ERROR MESSAGES

ERROR MESSAGES ARE HANDLED VIA A DICTIONARY STRUCTURE.

WORDS AND PHRASES ARE MULTIPLY REFERENCED USING ONLY ONE COPY OF THE WORD OR PHRASE IN CORE.

THIS PERMITS EXTENSIVE ERROR MESSAGE PRINTING AT MINIMAL STORAGE REQUIREMENTS.

THE FOLLOWING DEMONSTRATES TYPICAL ERROR MESSAGES:

```
ML11 DVC FTL ERR 00077 ON UNIT 07 TST 027 SUB 002 PC: 050432
ASYNCHRONOUS MODULE FAILURE
EXCESSIVE DATA ERRORS DURING INITIAL ARR RD_WRT

ML11 DVC FTL ERR  00112 ON UNIT 03 TST 037 SUB 000 PC: 056466
ASYNCHRONOUS MODULE FAILURE
```

ARRAY ADRS MULTIPLEXER FAILURE
FAILED AT DSA: 000000

3.2.1 ERROR NUMBER DEFINITION

ERROR NO.	FAILING LOGIC
1	DRIVE DID NOT RESPOND WITHIN 1.5 US
2	DSA REG READ/WRITE ERROR DURING DRIVE SEL TEST
3	UNIQUE DRIVE SELECTION ERROR
4	ML REGISTER READ WRITE ONES/ZEROES ERROR
5	ML REGISTER SHIFTING ONES/ZEROES ERROR
6	ML REGISTER INITIALIZATION ERROR
7	CONTROL BUS BAD PARITY NOT DETECTED. (CPAR NOT SET)
8	CONTROL BUS GOOD PARITY NOT DETECTED. (CPAR SET)
9	CONTROL BUS BAD PARITY GENERATED. (MCPE SET)
10	ARRAY SIZING LOGIC ERROR
11	GO BIT NOT CLR AFTER NOOP FUNCTION
12	ILF BIT SET DURING NOOP FUNCTION
13	OPI BIT SET DURING NOOP FUNCTION
14	GO BIT NOT SET DURING WRITE CHECK FUNCTION
15	DRY BIT CLEARED WHILE GO CLEARED DURING WRITE CHECK FUNCTION TEST
16	DRY BIT SET WHEN GO SET DURING WRITE CHECK FUNCTION
17	ILF SET DURING WRITE CHECK FUNCTION
18	OPI BIT SET DURING WRITE CHECK FUNCTION
19	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'
20	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FUNCTION'
21	DRY BIT NOT SET AFTER WRITE CHECK FUNCTION
22	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'
23	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FAILURE'
24	GO BIT NOT SET DURING WRITE FUNCTION

```
                25              DRY BIT CLEAR WITH GO CLEAR DURING WRITE FUNCTION.
                26              DRY BIT SET WITH GO BIT DURING WRITE FUNCTION.
                27              ILF BIT SET DURING WRITE FUNCTION
                28              OPI BIT SET DURING WRITE FUNCTION
                29              GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
                30              GO BIT NOT CLEAR AFTER WRITE FUNCTION 'SYNC FAILURE'
                31              DRY BIT NOT SET AFTER WRITE FUNCTION.
                32              GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
                33              GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
                34              GO BIT NOT SET DURING READ FUNCTION.
                35              DRY BIT SET WHILE GO CLEAR DURING READ FUNCTION.
                36              DRY BIT SET WHILE GO SET DURING READ FUNCTION.
                37              ILF BIT SET DURING READ FUNCTION.
                38              OPI BIT SET DURING READ FUNCTION
                39              GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
                40              GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
                41              DRY BIT NOT SET AFTER READ FUNCTION
                42              GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
                43              GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
                44              GO BIT NOT CLEAR AFTER CLEAR FUNCTION
                45              DRY BIT SET WHILE GO SET DURING CLEAR FUNCTION
                46              DRY BIT NOT SET AFTER CLEAR FUNCTION .
                47              ILF BIT SET DURING CLEAR FUNCTION
                48              OPI BIT SET DURING CLEAR FUNCTION
                49              ERROR REGISTER DID NOT CLEAR AFTER DRIVE CLEAR.
                50              COMPOSITE ERROR BIT NOT SET AFTER MLER BITS SET
                51              ATA BIT SETTING ERROR
                52              ATTN BIT SETTING ERROR
                53              ATTN BIT NOT CLEARED BY MLCS1 NOOP FUNCTION
```

```
54          ATA BIT NOT CLEAR AFTER WRITING A ONE TO IT
55          WRITING A ONE TO OTHER DRIVES ATA BIT CLEARED THIS DRIVES ATA BIT
56          GO BIT NOT CLEARED AFTER SEARCH FUNCTION
57          ILF BIT SET DURING SEARCH FUNCTION
58          NO-OP FUNCTION DID NOT CLEAR THE ATA BIT AFTER BEING SET
59          ATTN BIT NOT SET AFTER SEARCH FUNCTION
60          OPI BIT SET DURING SEARCH FUNCTION AT PRESENT ARRAYS
61          OPI BIT NOT SET AFTER SEARCH AT NON-PRESENT ARRAYS
62          GO BIT NOT CLEAR AFTER READ-IN-PRESET FUNCTION
63          ILF BIT SET DURING READ-IN-PRESET FUNCTION
64          OPI BIT SET DURING READ-IN-PRESET FUNCTION
65          ECC INITIALIZE DID NOT CLEAR MEMORY AFTER POWER UP WITH BAD BATTERY BACK-UP
66          GO BIT NOT CLEARED AFTER ILLEGAL FUNCTION
67          ILLEGAL FUNCTION NOT DETECTED
68          OPI BIT SET WITH ILLEGAL FUNCTION
69          RMR BIT NOT SET AFTER MODIFYING REG WITH FUNCTION IN PROGRESS
70          MEMORY ARRAY PROM CHECK SUM ERRORS DURING INITIAL PROM READS
71          NIBBLE OFF SET COUNTS GREATER THAN 14 DETECTED
72          UNS BIT SET WITH GOOD UV DATA
73          UNS BIT SET WITH GOOD UV DATA
74          UNS BIT NOT SET WITH BAD UV DATA
75          UNS BIT NOT SET WITH BAD UV DATA
76          MEMORY ARRAY PROM ROW/COL DATA ORING ERROR
77          BAD NIBBLE THRESHOLD OF 36 EXCEEDED DURING INITIAL ARRAY READ/WRITE TEST
78          UNIQUE PROM SELECTION ERROR
79          FAILURE TO FIND GOOD ROW DURING READ WRITE ARRAY WITH PROM DATA
80          MEMORY ARRAY TIMING AND CONTROL FAILURE TO REFRESH MEMORY
81          DATA ERRORS DETECTED AT LAST BLOCK DURING ADDRESSES COUNTER TEST.  (TEST ABORTED)
```

```
                82                  ADDRESS COUNTER ERROR
                83                  UNIQUE MEMORY ARRAY MODULE SELECTION FAILURE
                84                  ALL BITS IN ALL NIBBLES TESTED DURING SEQUENCER EXISTENCE TEST WERE IN  ERROR (FAIL
                85                  INTERMEDIATE FAILURE.  SOME BITS IN NIBBLES TESTED WERE IN ERROR (CONTINUE TESTING)
                86                  SYNC BUS DATA BIT WRITE PATH CONTINUITY FAILURE
                87                  SYNC BUS DATA BIT READ PATH CONTINUITY FAILURE
                88                  RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING WRITE FUNCTION
                89                  RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING READ FUNCTION
                90                  SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
                91                  SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (SHIFTED BIT NIBBLE PATTERN)
                92                  SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
                93                  SYNC DATA BUS READ PATH UNIQUE DATA BIT FAILURE
                94                  NIBBLE OFF SET COUNTERS FAILURE
                95                  CS1 FUNCTION ABORT FAILURE DURING CLASS 'A' ERROR
                96                  CS1 FUNCTION ABORT FAILURE DURING CLASS 'B' ERROR
                97                  LBT BIT SET BEFORE A LAST BLOCK TRANSFER
                98                  DSA REGISTER INCREMENT FAILURE DURING NON LAST BLOCK TRANSFERS.
                99                  LBT BIT NOT CLEAR AFTER LOADING DSA REG
               100                  LBT BIT NOT SET AFTER A LAST BLOCK TRANSFER
               101                  DSA REGISTER INCREMENT FAILURE AFTER A LAST BLOCK TRANSFER
               102                  IAE BIT NOT SET AT INVALID SECTOR ADDRESSES
               103                  AOE BIT NOT SET AFTER ADDRESS OVERFLOW
               104                  SC BIT NOT AFTER CS1 FUNCTION ADORT
               105                  GOOD DATA BUS PARITY NOT DETECTED
               106                  GOOD DATA BUS PARITY NOT GENERATED
               107                  UNS BIT SET AFTER WRITING TO A SECTOR DURING PROM DATA TEST
               108                  UNS BIT NOT SET WITH BAD UV DATA
               109                  WCE BIT SET DURING MBUS WRITE/READ FUNCTION TROUBLE SHOOTING LOOP TEST
               110                  UNIQUE REGISTER SELECTION TEST FAILURE
```

```
111     FAILURE TO FIND GOOD MOS RAM ROW DURING ARRAY ADRS MUX TEST (INTERMEDIATE DIAG MSG)
112     UNIQUE ARRAY MODULE ROW/COL ADDRESSING  FAILURE
113     DRIVE TYPE REGISTER VALUE WAS NOT CORRECT
114     TRE BIT SET UNEXPECTEDLY DURING A WRITE CHECK TRANSFER  (INTERMEDIATE DIAG ERROR)
115     TRE BIT SET UNEXPECTEDLY DURING A WRITE TRANSFER (INTERMEDIATE DIAG ERROR)
116     TRE BIT SET UNEXPECTEDLY DURING A READ TRANSFER (INTERMEDIATE DIAG ERROR)
117     TRE BIT DID NOT SET AFTER A REGISTER MODIFICATION ERROR (EXCEPTION WAS NOT ASSERTED)
118     DATA DIAGNOSTIC REGISTER (D1 D2 E2) INITIALIZATION ERRORS
119     RH CONTROLLER FAILED EXISTANCE PROBE TEST
120     NED BIT SET DURING MASS BUS HANDSHAKE PROBE
121     DATA DIAGNOSTIC REGISTER (D1 D2 E2) ONE'S  ZERO'S READ/WRITE ERRORS
122     DATA DIAGNOSTIC REGISTER (D1 D2 E2) SHIFTING 1'S AND 0'S READ/WRITE ERRORS
123     ECC HARD ERROR BIT NOT SET WHEN UNCORRECTABLE ECC ERRORS WERE READ
124     ECC ERROR REGISTER FAILURE TO LATCH FAILING ERROR CORRECTION INFORMATION
125     ECC ERROR REGISTER FAILURE TO CLEAR
126     ECC ERROR LOCATION REGISTER FAILED TO CLOCK IN DSA ADDRESS
127     ECC ERROR LOCATION REGISTER DATA BIT ERRORS
128     ECC ERROR LOCATION REGISTER INITIALIZATION ERRORS
129     ECC HARD ERROR BIT FAILED TO SET NOT SET
130     DATA CHECK ERROR BIT FAILED TO SET / NOT SET
131     CRC DATA BUS FAILURE.  BIT CONTINUITY / UNIQUENESS ERRORS
132     UNIQUE NIBBLE CRC GENERATION CODE FAILURES
133     UNIQUE WORD CRC GENERATION CODE FAILURES
134     CORRECTABLE ERROR SYNDRONE DECODE FAILURE.  FAILURE TO COMPLIMENT EXPECTED FAILING B
135     CORRECTABLE ERROR SYNDRONE DECODE FAILURE.  UNEXPECTED BIT(S) FOUND COMPLIMENTED
136     ECH OR UNC BIT NOT SET DURING READS WITH ECC ERRORS IN CHANNEL > 35
137     ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERRORS.
        UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED
138     ECH OR UNC BIT NOT SET WHEN MULTIPLE CHANNEL ERRORS WERE READ
```

```
139                     ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERROR.
                        UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED
140                     ECC FAILURE TO DETECT AND CORRECT SINGLE BIT CHANNEL ERRORS
141                     ECC FAILURE TO DETECT AND CORRECT MULTIPLE BIT CHANNEL ERRORS
142                     FAILURE TO FIND GOOD BLOCK DURING ARRAY SELECT TEST
148                     SC BIT SET DURING MASS BUS WRITE OR WRITE CHECK TRANSFERS DURING TEST 21 AND 61
149                     VV BIT WAS SET WHEN TESTED AND GOT CLEARED AFTER A READ-IN-PRESET FUNCTION WAS PERFO
150                     VV BIT WAS CLEARED WHEN TESTED AND DID NOT GET SET WHEN A READ-IN-PRESET FUNCTION WA
151                     THE UNS BIT DID NOT SET WHEN BOX POWER WAS LOST
152                     THE VV BIT DID NOT CLEAR WHEN DRIVE AC POWER RESUMED WITH BAD BATTERY BACK-UP
153                     DC LO DID NOT INITIATE 'MB DIS LO' RESULTING IN THE ML-11 REGISTERS NOT GETTING CLEA
                        POWER UP.
154                     VV BIT GOT CLEARED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP
155                     ECC INIT CLEARED OUT MEMORY AFTER POWER FAILED WITH GOOD BATTERY BACK-UP
156                     BATTERY BACK-UP FAILED TO MAINTAIN DATA INTEGRITY DURING POWER FAIL
```

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE
TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED.
THE "EOP" SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END
OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

5.0 DEVICE INFORMATION TABLES

HARDWARE DEFAULT PTABLE

```
.WORD   176400          ;RH ADDRESS
.WORD   70              ;RH TYPE
.WORD   204             ;RH VECTOR ADDRESS
.WORD   16.             ;NUMBER OF ARRAY MODULES
.WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
.WORD   0               ;ML-11 DRIVE NUMBER
.WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO
```

6.0 TEST SUMMARIES

TST1. MASS BUS READY

TEST THE RH CONTROLLER FOR EXISTANCE

TST2. MASS BUS HANDSHAKE

TEST MASS BUS ---> UNIBUS COMMUNICATIONS

TST3. DRIVE PRESENT

TEST TO SEE IF THE DRIVE UNDER TEST EXIST.

TST4. DRIVE SELECTION

SEE IF SELECTING OTHER DRIVES ON RH EFFECTS DRIVE UNDER TEST.

TST5. READ WRITE REGISTER ONE'S ZERO'S TEST

TEST REGISTERS READ WRITE CAPABILITY AND UNIQUENESS

TST6. READ WRITE REGISTER SHIFTING ONE'S AND ZEROES

TEST REGISTERS FOR UNIQUE DATA BITS.

TST7. REGISTER INITIALIZATION

TEST REGISTERS FOR CORRECT INIT DATA.

TST8 REGISTER SELECTION TEST

TEST FOR UNIQUE REGISTER SELECTION

TST9. PRINT DRIVE SERIAL NUMBER

PRINT THE CONTENTS OF MLSN IF THE SOFTWARE QUESTION WAS ANSWERED 'YES'.

TST10. C-BUS PARITY

TEST IF DRIVE CAN DETECT BAD PARITY ON C-BUS AND GENERATE GOOD PARITY.

TST11. MEMORY SIZING

SEE IF MEMORY SIZING LOGIC DETECTS AND RECORD CORRECT NUMBER OF ARRAYS PRESENT.

TST12. NO-OP FUNCTION

SEE IF A NO-OP FUNCTION CAN BE EXECUTED.

TST13. WRITE CHECK FUNCTION

SEE IF A WRITE CHECK FUNCTION CAUSES THE DRIVE TO HANG.

TST14. WRITE FUNCTION

SEE IF A WRITE FUNCTION CAUSES THE DRIVE TO HANG.

TST15. READ FUNCTION

SEE IF A READ FUNCTION CAUSES THE DRIVE TO HANG.

TST16. CLEAR FUNCTION

SEE IF A CLEAR FUNCTION CAN BE EXECUTED.

TST17. DIAGNOSTIC REGISTER READ WRITE

TEST THE DIAGNOSTIC REGISTERS FOR
1'S/0'S , SHIFTING 1'S/0'S AND
INITIALIZATION

TST18. COMPOSITE ERROR BIT TEST

SEE IF EACH INDIVIDUAL ERROR BIT IN MLER CAUSES A COMPOSITE ERROR.

TST19. ATA BIT

TEST IF THE ATA BIT CAN BE SET AND CLEARED.

TST20. SEARCH FUNCTION

SEE IF A SEARCH FUNCTION CAN BE EXECUTED ON ALL PRESENT ARRAYS.

TST21. POWER FAIL TEST *MANUAL INTERVENTION TEST*
TEST THE VV BIT SETTING/CLEARING, ECC INIT, REGISTER CLEARING UNS BIT SETTING, AC AND DC LOW.

TST22. ILLEGAL FUNCTION

SEE IF WRITING AN ILLEGAL FUNCTION TO CS1 CAN BE DETECTED AND THAT A TRANSFER IS NOT INITIATED.

TST23. REGISTER MODIFICATION REFUSED

TEST TO SEE IF WRITING TO SPECIFIC REGISTERS ARE ABORTED WHILE THE DRIVE IS ACTIVE. SEE IF WRITING TO NON-SPECIFIC REGISTERS ARE ALLOWED WHILE DRIVE IS ACTIVE.

TST24. INITIAL PROM TEST

TEST PROMS FOR EXISTENCE.

TST25. PROM 'OR' FUNCTION TEST

TEST THE PROM DATA ORING FUNC

TST26. UV ERROR TEST

TEST ABILITY OF UV ERR PROMS TO DETECT ALL POSSIBLE CHECK SUM ERRORS.

TST27. INITIAL ARRAY TEST

TEST ARRAY TIMING AND CONTROLFOR EXISTENCE.

TST28. PROM SELECTION TEST

TEST FOR UNIQUE PROM SELECTION.

TST29. READ WRITE MEMORY ARRAY WITH PROM DATA (DIAG MODE)

SEE IF MEMORY CAN BE WRITTEN AND READ.

ALSO FIND ERROR FREE BLOCK OF MEMORY FOR FUTURE TESTS.

TST30. REFRESH TIMING

TEST TO SEE IF MEMORY CAN BE REFRESHED.

TST31. ADDRESS COUNTER

TEST THE ADDRESS COUNTER FOR ABILITY TO COUNT THROUGH ALL POSSIBLE MEMORY ADDRESSES.

TST32. ARRAY MODULE SELECTION

TEST FOR UNIQUE ARRAY MODULE SELECTION

TST33. SEQUENCER EXISTENCE TEST

TEST TO SEE IF BASIC SEQUENCER TIMING EXISTS.

TST34. SYNC DATA BUS CONTINUITY/WRITE PATH

TEST SYNCHRONOUS DATA BUS WRITE PATH FOR CONTINUITY BY READ-ING WRITING ONE'S AND ZERO'S.

TST35. SYNC DATA BUS CONTINUITY/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR CONTINUITY BY READING WRITING ONE'S AND ZEROES.

TST36. RAM-BUS ADDRESS COUNTER/WRITE PATH

TEST ABILITY OF THE RAM-BUS ADDRESS COUNTERS TO LOAD/UNLOAD THE SKIP DURING WRITE FUNCTIONS.

TST37. RAM BUS ADRS COUNTER/READ PATH

TEST ABILITY OF RAM/BUS ADRS COUNTERS TO LOAD/UNLOAD THE SKIP RAM DURING READ FUNCTIONS.

TST38. SYNC DATA BUS BIT UNIQUENESS/WRITE PATH

TEST SYNCHRONOUS DATA BUS FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONE'S AND ZERO'S TO THE ML.

TST39. SYNC DAT BUS BIT UNIQUENESS/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR DATA BIT UNIQUENESS

BY WRITING SHIFTING PATTERNS OF ONES AND ZEROES TO THE

TST40. ARRAY ADDRESS MUX

TEST FOR UNIQUE ROW AND COLUMN ADDRESSING

TST41. NIBBLE OFFSET

TEST NIBBLE OFFSET COUNTERS TO COUNT TO 14 NIBBLE DATA TO BE SHIFTED ON DETECTION OF BAD NIBBLES.

TST42. CS1 FUNCTION ABORT

SEE IF A CLASS 'B' ERROR ABORTS A FUNCTION WHILE IN PROGRESS.

SEE IF A CLASS'A' ERROR IS DETECTED BUT FUNCTION IS ALLOWED TO COMPLETE.

TST43. LAST BLOCK INDICATOR

TEST THE LAST BLOCK INDICATOR BIT FOR NOT SETTING BELOW THE LAST AND SETTING AND CLRING AT THE LAST BLOCK

TST44. INVALID ADDRESS TEST

FOR ALL ILLEGAL DSA ADDRESSES READ THE IAE BIT SET.

TST45. ADDRESS OVERFLOW

TEST FOR AOE ON TRANSFERS WHICH EXTEND BEYOND THE LAST BLOCK.

TST46. SYNC BUS PARITY

TEST FOR BAD PARITY DETECTION AND GOOD PARITY GENERATION.

TST47. WRITE READ MEMORY ARRAY (M-BUS BLOCK MODE)

WRITE READ MEMORY VIA M-BUS BLOCK WITH MINIMUM OVERHEAD

TST48. TEST THE CRC DATA BUS BETWEEN THE CRC GENERATORS AND THE CRC/MBUS DATA MUX FOR CONTINUITY AND BIT UNIQUENESS

TST49. TEST CRC CODES GENERATED FOR ONE CRC GROUP (52 UNIQUE NIBBLES)

TST50. TEST CRC CODES GENERATED FOR ONE CRC GROUP (13 UNIBUS WORDS)

TST51. TEST SYNDRONE DECODE AND ERROR CORRECTION TO DECODE AND CORRECT SINGLE BIT AND MULTIPLE BIT CHANNEL ERRORS

TST52. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE CHANNEL

ERRORS

TST53. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE MULTIPLE CHANNEL ERRORS

TST54. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR SIGLE BIT CHANNEL ERRORS

TST55. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR MULTIPLE BIT CHANNEL ERRORS

TST56. TEST THE ECC ERROR REGISTER FOR CLEARING AND LATCHING OF ECC ERROR INFORMATION ON DETECTION OF ECC ERRORS

TST57. TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS, CLEARING AND LATCHING

TST58. VIA ECC_DM AND ECC_DIS TEST THE ECH BIT FOR SETTING AND NOT SETTING

TST59. VIA ECC_EN, ECC_DM AND ECC_DIS TEST THE DCK BIT FOR SETTING AND NOT SETTING

TST60. PROM DATA TEST

VERIFY THAT CHECK SUM VALUES FOR ALL PROM LOCATIONS ARE CORRECT.

TST61. BATTERY BACK-UP TEST *MANUAL INTERVENTION TEST*
TEST THE DRIVE BATTERY BACK-UP DURING POWER FAILS AND ALSO TEST VV BIT, ECC INIT.

```
                                .SBTTL  PROGRAM HEADER AND TABLES

000000                                  .ENABL  ABS,AMA
        002000                          .       =       2000

002000                                  BGNMOD

                                ;++
                                ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                ;--

002000                                  POINTER ALL


002000                                  HEADER  CZMLA,D,0,1800.,0

                                ;
                                ;       NAMES OF DEVICES SUPPORTED BY THIS PROGRAM
                                ;
002122                                  DEVTYP <ML-11>


                                ;
                                ;       TEST DESCRIPTION
                                ;
002130                                  DESCRIPT <ML-11 LOGIC TEST>


                                ;
                                ;       THE GLOBAL ERROR TABLE (INFORMATION
                                ;       USED IN A CALL TO THE MACRO 'ERROR')
                                ;
002152                          ERRTBL
002152  000000                  ERRTYP::        .WORD   0
002154  000000                  ERRNBR::        .WORD   0
002156  000000                  ERRMSG::        .WORD   0
002160  000000                  ERRBLK::        .WORD   0

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRES OF EACH TEST.
                                ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                ;--

002162                                  DISPATCH 61


                                ;++
                                ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
                                ; AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
                                ;--
```

```
                                        BGNHW   DFPTBL
                                        .WORD   176400          ;RH ADDRESS
                                        .WORD   70              ;RH TYPE
                                        .WORD   204             ;RH VECTOR ADDRESS
                                        .WORD   1               ;NUMBER OF ARRAY MODULES
                                        .WORD   1               ;IS DRIVE OPTION ML11A,  1=16K,  0=64K
                                        .WORD   0               ;ML-11 DRIVE NUMBER
                                        .WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO

                                        ENDHW


                                ;++
                                ; THE DEFAULT SOFTWARE P-TABLE CONTAINS VARIOUS DATA USED BY THE
                                ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE SET
                                ; UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR AT RUN
                                ; TIME.
                                ;--

                                        BGNSW   SFPTBL

                                PRSN::          .WORD   0       ;PRINT SERIAL NUMBER, 1=YES,  0=NO
                                ERRTHR::        .WORD   1       ;ENABLE ERROR THRESHOLD 1=YES, 0=NO
                                REGDMP::        .WORD   0       ;ENABLE REGISTER DUMPS 1=YES, 0=NO
                                ONEPAS::        .WORD   1       ;DROP UNIT AFTER ONE (EOP)
                                INTERVEN::      .WORD   0       ;MANUAL INTERVENTION TESTS 1=YES, 0=NO
                                        ENDSW
```

```
                                        ;++
                                        ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--

002412                                          BGNHRD


002414                                          GPRMA   MSGH1,0,0,0,177777,YES
002424                                          GPRMD   MSGH2,2,0,77,11,70,YES
002436                                          GPRMD   MSGH3,4,0,777,0,777,YES
002450                                          GPRMD   MSGH4,6,D,77,1,16.,YES
002462                                          GPRML   MSGH5,10,1,YES
002470                                          GPRMD   MSGH6,12,0,7,0,7,YES
002502                                          GPRML   MSGH7,14,1,YES

002510                                          ENDHRD


002510  122  110  040  MSGH1:  .ASCIZ  /RH CONTROLER BASE REGISTER ADDRESS  ?/
002556  122  110  040  MSGH2:  .ASCIZ  /RH CONTROLER TYPE '70  OR  11'      ?/
002624  122  110  040  MSGH3:  .ASCIZ  /RH CONTROLER VECTOR ADDRESS         ?/
002670  116  125  115  MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES IN THIS UUT ?/
002736  111  123  040  MSGH5:  .ASCIZ  /IS UUT DRIVE OPTION TYPE AN 'ML11A' ?/
003004  104  122  111  MSGH6:  .ASCIZ  /DRIVE SELECT NUMBER OF THIS UUT     ?/
003052  111  123  040  MSGH7:  .ASCIZ  /IS PARITY DISABLED IN THIS UUT      ?/
                                .EVEN

                                        ;++
                                        ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--

003120                                          BGNSFT


003122                                          GPRML   MSGS1,0,1,YES
003130                                          GPRML   MSGS2,2,1,YES
003136                                          GPRML   MSGS3,4,1,YES
003144                                          GPRML   MSGS4,6,1,YES
003152                                          GPRML   MSGS5,10,1,YES
                                                .EVEN

003160                                          ENDSFT
```

```
003160     120     122     111  MSGS1:  .ASCIZ  /PRINT DRIVE SERIAL NUMBER          ?/          ;PRINT DRIVE SERIAL NUMBER?
003224     105     116     101  MSGS2:  .ASCIZ  /ENABLE ERROR MESSAGE THRESHOLD     ?/          ;ERROR THRESHOLD FLAG
003270     105     116     101  MSGS3:  .ASCIZ  /ENABLE REGISTER DUMP ON ERRORS     ?/          ;REG DUMP FLAG
003334     105     130     111  MSGS4:  .ASCIZ  /EXIT PROGRAM AFTER ONE PASS        ?/          ;EXIT PROG FLAG
003400     105     116     101  MSGS5:  .ASCIZ  /ENABLE MANUAL INTERVENTION TESTS   ?/
                                        .EVEN

                                ;++
                                ; THIS TABLE IS USED BY THE RUNTIME SERVICES
                                ; TO PROTECT THE LOAD MEDIA.
                                ;--

003444                                  BGNPROT

003444  177777                          -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
003446  177777                          -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
003450  177777                          -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

003452                                  ENDPROT


003452                          $PATCH::
003452                                  .BLKW   20


003512                                  ENDMOD
```

```
;ML3AD                                                  22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)

;          0001  MODULE ML3AD =
;          0002  BEGIN
;          0003
;          0004  %SBTTL 'REPORT CODE SECTION'
;          0005
;          0006  REQUIRE 'BLSMAC.REQ';
;          1496
;          1497  !+
;          1498  !  THE REPORT CODING SECTION CONTAINS THE
;          1499  ! "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
;          1500  !-
;          1501
;          1502  BGNRPT;
;          1503  RETURN;
;          1504  ENDRPT;


                                        .SBTTL  LRPT REPORT CODE SECTION

004646  000207                  LRPT:   RTS     PC                              ;                       1495

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words


                                        .SBTTL  L$RPT REPORT CODE SECTION
004650  004767  177772          L$RPT:: JSR     PC,LRPT                         ;                       1503
004654  104425                          TRAP    25
004656  000207                          RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words
```

```
                        1505
                        1506  !+
                        1507  ! THE AUTODROP CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE
                        1508  ! CODE IF THE "ADR" FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE
                        1509  ! CHECKED TO SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
                        1510  ! DROPPED FROM TESTING.  ISSUE A "DODU" FOR THOSE THAT DON'T RESPOND.
                        1511  !-
                        1512
                        1513  BGNAUTO;
                        1514  RETURN;
                        1515  ENDAUTO;
```

```
                                        .SBTTL  LAUTO REPORT CODE SECTION
004660  000207                  LAUTO:  RTS     PC                              ;  1504

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words
```

```
                                        .SBTTL  L$AUTO REPORT CODE SECTION
004662  004767  177772          L$AUTO::JSR     PC,LAUTO                        ;  1514
004666  104461                          TRAP    61
004670  000207                          RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words
```

```
                                                        22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
                                                        22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)
    116 ;ML3AD
    117 ;                   REPORT CODE SECTION
    118
    119 ;           1516
    120 ;           1517    !+
    121 ;           1518    ! THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
    122 ;           1519    ! TO NO LONGER BE TESTED.
    123 ;           1520    !-
    124 ;           1521
    125 ;           1522    BGNDU;
    126 ;           1523    RETURN;
    127 ;           1524    ENDDU;
    131
    132                                     .SBTTL  LDU REPORT CODE SECTION
    136 004672  000207                  LDU:    RTS     PC                              ;                       1515
    137
    138                                 ; Routine Size:  1 word
    139                                 ; Maximum stack depth per invocation:  0 words
    144
    145
    149
    150                                     .SBTTL  L$DU REPORT CODE SECTION
    154 004674  004767  177772          L$DU::  JSR     PC,LDU                          ;                       1523
    155 004700  104453                          TRAP    53
    156 004702  000207                          RTS     PC
    157
    158                                 ; Routine Size:  4 words
    159                                 ; Maximum stack depth per invocation:  0 words
    164
    165
    166 ;           1525
    167 ;           1526    !+
    168 ;           1527    ! THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
    169 ;           1528    ! TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
    170 ;           1529    ! TO THE TEST CYCLE.
```

```
;ML3AD                                                          22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
;                REPORT CODE SECTION                            22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)

;          1530  !-
;          1531
;          1532  BGNAU;
;          1533  RETURN;
;          1534  ENDAU;

                                        .SBTTL  LAU REPORT CODE SECTION
004704  000207                  LAU:    RTS     PC                          ;                                  1524

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words



                                        .SBTTL  L$AU REPORT CODE SECTION
004706  004767  177772          L$AU::  JSR     PC,LAU                      ;                                  1533
004712  104452                          TRAP    52
004714  000207                          RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words


;          1535  END
;          1536
;          1537  ELUDOM
```

```
                                ;ML3AD                                          22-Mar-1982 11:35:31    TOPS
                                ;               REPORT CODE SECTION             22-Mar-1982 11:32:50    PA:<



                                ; Size:         20 code + 0 data words
                                ; Run Time:     00:02.9
                                ; Elapsed Time: 00:05.5
                                ; Memory Used:  24 pages
                                ; Compilation Complete
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (1)
;
;          0001  MODULE ML4AD =
;          0002  BEGIN
;          0003  !
;          0004  ! PRETTY BLF COMMANDS
;          0005  !
;          0006  !<BLF/LOWERCASE_KEY>
;          0007  !
;          0008  ! REQUIRE
;          0009  !
;          0010
;          0011  %SBTTL 'DECLARATION SECTION'
;          0012
;          0013  require 'BLSMAC.REQ';                    !BLISS INTERFACE MODULE
;          1503
;          1504  !
;          1505  ! CONSTANT LITERALS
;          1506  !
;          1507
;          1508  literal
;          1509      ONE = 1,                             !DATA BIT OF ONE
;          1510      ONES = %o'177777',                   !DATA PATTERN OF ONES
;          1511      ZERO = 0,                            !DATA BIT OF ZERO
;          1512      ZEROES = 0,                          !DATA PATTERN OF ZEROES
;          1513      NUM_OF_REG = 22,                     !NUMBER OF BLOCKS IN GLOBAL STORAGE 'ML-REG'
;          1514      FIELD_SIZ = 4,                       !FIELD SIZ FOR FIELD DECLARATIONS 'WORD_MAP'
;          1515      !
;          1516      !MLCS1 FUNCTION CODES
;          1517      !
;          1518      NOOP = 1,                            !NOOP FUNCTION
;          1519      DRV_CLR = %o'11',                    !DRIVE CLEAR FUNCTION
;          1520      RD_IN_PRE = %o'21',                  !READ IN PRESET FUNCTION
;          1521      SEARCH = %o'31',                     !SEARCH FUNCTION
;          1522      WRT_CHK = %o'51',                    !WRITE CHECK FUNCTION
;          1523      write = %o'61',                      !WRITE FUNCTION
;          1524      read = %o'71',                       !READ FUNCTION
;          1525      !
;          1526      ! DELAY ARGUMENTS
;          1527      !
;          1528      ONE_US = 1,                          !ONE MICRO SECOND DELAY
;          1529      FRTY_US = 40,                        !FORTY MICRO SECOND DELAY
;          1530      TWO_TH_US = 2000,                    !TWO THOUSAND MICRO SECOND DELAY
;          1531      ONE_SEC = 100,                       !ONE SECOND DELAY
;          1532      ONE_MS = 10;                         !ONE MILL SECOND DELAY
;          1533
;          1534  !
;          1535  ! FIELD DECLARATIONS
;          1536  !
;          1537
;          1538  field
;          1539      WORD_MAP =                           !MAPS GLOBAL STORAGE 'ML_REG' INTO REGISTER PERSONALITIES
;          1540          set
;          1541          REGISTER_ADD = [0, 0, 16, 0],    !REGISTERS ADDRESS
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (1)
;
;          1542          FORCE_HI = [1, 0, 16, 0],        !REGISTERS  FORCED HI BITS
;          1543          FORCE_LO = [2, 0, 16, 0],        !REGISTERS FORCED LO BITS
;          1544          DONT_CARE = [3, 0, 16, 0]        !REGISTERS IGNORE BITS
;          1545          tes,
;          1546      NIB_MAP =                            !MAPS OWN STORAGE NIB_SAVE INTO TEN FOUR BIT NIBBLES
;          1547          set
;          1548          NIB_0 = [0, 0, 4, 0],            !NIBBLE 0 BITS <0:3>
;          1549          NIB_1 = [0, 4, 4, 0],            !NIBBLE 1 BITS <4:7>
;          1550          NIB_2 = [0, 8, 4, 0],            !NIBBLE 2 BITS <8:11>
;          1551          NIB_3 = [0, 12, 4, 0],           !NIBBLE 3 BITS <12:15>
;          1552          NIB_4 = [1, 0, 4, 0],            !NIBBLE 4 BITS <16:19>
;          1553          NIB_5 = [1, 4, 4, 0],            !NIBBLE 5 BITS <20:23>
;          1554          NIB_6 = [1, 8, 4, 0],            !NIBBLE 6 BITS <24:27>
;          1555          NIB_7 = [1, 12, 4, 0],           !NIBBLE 7 BITS <28:31>
;          1556          NIB_8 = [2, 8, 4, 0],            !NIBBLE 8 BITS <32:35>
;          1557          NIB_9 = [2, 12, 3, 0]            !NIBBLE 9 BITS <36:39>
;          1558          tes,
;          1559      DT1_FLD =
;          1560          set
;          1561          E0_5 = [0, 0, 6, 0],
;          1562          C0_5 = [0, 6, 6, 0],
;          1563          CRC_DATA = [0, 13, 1, 0],
;          1564          SGL_DATA = [0, 14, 1, 0],
;          1565          UNC_DATA = [0, 15, 1, 0],
;          1566          EE_DATA = [0, 0, 16, 0],
;          1567          A0_5 = [1, 0, 6, 0],
;          1568          P0_5 = [1, 6, 6, 0],
;          1569          ECR_DATA = [1, 12, 1, 0],
;          1570          B0_5 = [2, 0, 6, 0]
;          1571          tes;
;          1572
;          1573  external
;          1574      REGDMP : volatile,               !REGISTER DUMP ON ERROR FLAG
;          1575      ONEPAS : volatile,               !DROP UNIT AFTER ONE PASS
;          1576      INTERVEN : volatile,                   !MANUAL INTERVENTION FLAG
;          1577      PRSN : volatile,                 !PRINT SERIAL NUMBER FLAG
;          1578      ERRTHR : volatile;               !ENABLE ERROR THRESHOLD FLAG
;          1579
;          1580  !<BLF/PAGE>
```

```
105 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
106 ;                DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)
107 ;
108 ;          1581  !
109 ;          1582  ! OWN STORAGE
110 ;          1583  !
111 ;          1584
112 ;          1585  own
113 ;          1586      NIB_SAVE : block [3] field (NIB_MAP) volatile,
                                                    !STORAGE LOCATION TO SAVE NIBBLE DATA READ DURING DIAG MODE
114 ;          1587
115 ;          1588      HW_OR_TBL : vector [127] volatile,
                                                    !STORES HARDWARE ORED PROM DATA DURING PROM OR FUNC TEST
116 ;          1589      PTBL_PTR : volatile,
                                                    !HARDWARE P-TABLE POINTER
117 ;          1590      OP_NUM_ARR : volatile,
                                                    !OPERATORS NUMBER  OF ARRAY INPUTTED
118 ;          1591      ARR_INC : volatile,
                                                    !ARRAY SELECTION INCREMENT VALUE
119 ;          1592      GOOD_BLK : volatile,
                                                    !GOOD BLOCK ADRS
120 ;          1593      PAR_DIS : volatile,
                                                    !PARITY DISABLE FLAG
121 ;          1594      CHIP_SIZ : volatile,
                                                    !MOS RAM CHIP SIZE
122 ;          1595      LST_BLK : volatile,
                                                    !LAST ADDRESSABLE BLOCK
123 ;          1596      ARR_16 : volatile,
                                                    !MAX NUMBER OF ARRAY ALLOWED
124 ;          1597      LST_ARR : volatile,
                                                    !LAST ADDRESSABLE ARRAY
125 ;          1598      IO_BUF : vector [256] volatile,
                                                    !INPUT OUTPUT BUFFER
126 ;          1599      STK_OFF : vector [10, byte] volatile,
                                                    !STACK OFFSET STORAGE LOCATION
127 ;          1600      stack : vector [198, byte] volatile,
                                                    !STACK OF 198 BYTE LOCATIONS
128 ;          1601      PD_TEMP : bitvector [16] volatile,
                                                    !PROM DATA STORAGE LOCATION DURING DIAG MODES
129 ;          1602      W_C_SIZE : volatile,
                                                    !STORES WORD COUNT FOR 16K OR 64K XFERS
130 ;          1603      RAS_INC : volatile,
                                                    !ROW ADRS STROBE INCREMENT
131 ;          1604      WT_DATA : volatile,
                                                    !SAVE WRITE DATA DURING REG READ WRITE TEST
132 ;          1605      RD_DATA : volatile,
                                                    !SAVE READ DATA DURING REG READ WRITE TEST
133 ;          1606      DRIVE_TYPE : volatile,
                                                    !DRIVE TYPE STORAGE LOCATION
134 ;          1607      LST_DOT_REG : volatile,
                                                    !LAST ML-11 REG INDEX FOR THIS TYPE RH CONTROLLER
135 ;          1608      REG_INIT_FLG : initial (0) volatile,
                                                    !FLAG TO DETECT DOING REG INIT TEST
136 ;          1609      A_CAL : volatile,
                                                    !CALCULATED CRC STORAGE LOCATION
137 ;          1610      B_CAL : volatile,
                                                    !CALCULATED CRC STORAGE LOCATION
138 ;          1611      P_CAL : volatile,
                                                    !CALCULATED CRC STORAGE LOCATION
139 ;          1612      A_GEN : volatile,
                                                    !GENERATED CRC STORAGE LOCATION
140 ;          1613      B_GEN : volatile,
                                                    !GENERATED CRC STORAGE LOCATION
141 ;          1614      P_GEN : volatile,
                                                    !GENERATED CRC STORAGE LOCATION
142 ;          1615      P_CNT : volatile,
                                                    !ERROR MESSAGE PRINT COUNTER
143 ;          1616      LIMIT : volatile,
                                                    !LIMIT OF ERROR MESSAGES PRINTED
144 ;          1617      DROP_CNT : volatile,
                                                    !COUNTS NUMBER OF PASSES DONE
145 ;          1618  !
146 ;          1619  !<BLF/NOFORMAT>
147 ;          1620  !
148 ;          1621     ML_REG: blockvector [NUM_OF_REG,FIELD_SIZ] field(WORD_MAP) !ML11 REGISTERS
149 ;          1622        preset (                                                 !STRUCTURE TO STORE INDIVIDULA
150 ;          1623                                                                 !REGISTER PERSONALITIES
151 ;          1624                                                                 !ie. REGISTER ADDRESSES
152 ;          1625                                                                 !BITS FORCED HIGH
153 ;          1626                                                                 !BITS FORCED LOW
154 ;          1627                                                                 !READ ONLY BITS
155 ;          1628            [0,FORCE_HI]    = %o'004000',    !MLCS1
156 ;          1629
157 ;          1630            [0,FORCE_LO]    = %o'173701',
158 ;          1631            [0,DONT_CARE]   = %o'160200',
159 ;          1632
```

```
;SAU REPORT CODE SECTION

;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)

;          1633          [5,FORCE_LO]    = %o'25077',    !MLDS
;          1634          [5,FORCE_HI]    = %o'010600',
;          1635          [5,DONT_CARE]   = %o'000100',
;          1636
;          1637          [6,FORCE_LO]    = %o'014620',   !MLER
;          1638
;          1639          [7,DONT_CARE]   = %o'177400',   !MLAS
;          1640
;          1641          [8,FORCE_LO]    = %o'100000',   !MLPA
;          1642
;          1643          [10,FORCE_LO]   = %o'000020',   !MLMR
;          1644          [10,DONT_CARE]  = %o'177400',
;          1645
;          1646          [11,FORCE_HI]   = %o'000110',   !MLDT
;          1647          [11,FORCE_LO]   = %o'177666',
;          1648          [11,DONT_CARE]  = %o'000001',
;          1649
;          1650          [13,FORCE_LO]   = %o'140300',   !MLE1
;          1651
;          1652          [14,FORCE_LO]   = %o'100300',   !MLE2
;          1653
;          1654          [17,FORCE_LO]   = %o'010000',   !MLEE
;          1655          [21,DONT_CARE]  = %o'000000'    !MLCS2
;          1656                  ) volatile,
;          1657
;          1658
;          1659  REM_TBL:vector [63,byte]          !REMAINDER TABLE
;          1660    preset (                        !STRUCTURE TO STORE PRECALCULATED
;          1661          [0] = %b'000001',         !CRC REMAINDER VALUES FOR CRC CODE
;          1662          [1] = %b'000010',         !GENERATION
;          1663          [2] = %b'000100',
;          1664          [3] = %b'001000',
;          1665          [4] = %b'010000',
;          1666          [5] = %b'100000',
;          1667          [6] = %b'000011',
;          1668          [7] = %b'000110',
;          1669          [8] = %b'001100',
;          1670          [9] = %b'011000',
;          1671          [10] = %b'110000',
;          1672          [11] = %b'100011',
;          1673          [12] = %b'000101',
;          1674          [13] = %b'001010',
;          1675          [14] = %b'010100',
;          1676          [15] = %b'101000',
;          1677          [16] = %b'010011',
;          1678          [17] = %b'100110',
;          1679          [18] = %b'001111',
;          1680          [19] = %b'011110',
;          1681          [20] = %b'111100',
;          1682          [21] = %b'111011',
;          1683          [22] = %b'110101',
;          1684          [23] = %b'101001',
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (2)

```
;ML4AD
;                    DECLARATION SECTION

;          1685              [24] = %b'010001',
;          1686              [25] = %b'100010',
;          1687              [26] = %b'000111',
;          1688              [27] = %b'001110',
;          1689              [28] = %b'011100',
;          1690              [29] = %b'111000',
;          1691              [30] = %b'110011',
;          1692              [31] = %b'100101',
;          1693              [32] = %b'001001',
;          1694              [33] = %b'010010',
;          1695              [34] = %b'100100',
;          1696              [35] = %b'001011',
;          1697              [36] = %b'010110',
;          1698              [37] = %b'101100',
;          1699              [38] = %b'011011',
;          1700              [39] = %b'110110',
;          1701              [40] = %b'101111',
;          1702              [41] = %b'011101',
;          1703              [42] = %b'111010',
;          1704              [43] = %b'110111',
;          1705              [44] = %b'101101',
;          1706              [45] = %b'011001',
;          1707              [46] = %b'110010',
;          1708              [47] = %b'100111',
;          1709              [48] = %b'001101',
;          1710              [49] = %b'011010',
;          1711              [50] = %b'110100',
;          1712              [51] = %b'101011',
;          1713              [52] = %b'010101',
;          1714              [53] = %b'101010',
;          1715              [54] = %b'010111',
;          1716              [55] = %b'101110',
;          1717              [56] = %b'011111',
;          1718              [57] = %b'111110',
;          1719              [58] = %b'111111',
;          1720              [59] = %b'111101',
;          1721              [60] = %b'111001',
;          1722              [61] = %b'110001',
;          1723              [62] = %b'100001')volatile,
;          1724
;          1725    DT_1:blockvector[5,3] field (DT1_FLD)          !DATA TABLE 1
;          1726    preset (                                       !STRUCTURE TO STORE TEST DATA
;          1727              [0,E0_5] = %b'111111',               !FOR TEST 56 'ECC ERROR LOCATION TEST'
;          1728              [0,C0_5] = %b'100100',
;          1729              [0,CRC_DATA] = %b'1',
;          1730              [0,SGL_DATA] = %b'1',
;          1731              [0,UNC_DATA] = %b'0',
;          1732              [0,A0_5] = %b'000000',
;          1733              [0,P0_5] = %b'111111',
;          1734              [0,ECH_DATA] = %b'0',
;          1735              [0,B0_5] = %b'000000',
;          1736              [1,E0_5] = %b'111111',
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)
;
;          1737          [1,CO_5] = %b'100100',
;          1738          [1,CRC_DATA] = %b'1',
;          1739          [1,SGL_DATA] = %b'1',
;          1740          [1,UNC_DATA] = %b'0',
;          1741          [1,AO_5] = %b'111111',
;          1742          [1,PO_5] = %b'000000',
;          1743          [1,ECA_DATA] = %b'0',
;          1744          [1,BO_5] = %b'000000',
;          1745          [2,EO_5] = %b'111111',
;          1746          [2,CO_5] = %b'000101',
;          1747          [2,CRC_DATA] = %b'0',
;          1748          [2,SGL_DATA] = %b'0',
;          1749          [2,UNC_DATA] = %b'1',
;          1750          [2,AO_5] = %b'000000',
;          1751          [2,PO_5] = %b'111111',
;          1752          [2,ECA_DATA] = %b'1',
;          1753          [2,BO_5] = %b'111111',
;          1754          [3,EO_5] = %b'111111',
;          1755          [3,CO_5] = %b'000101',
;          1756          [3,CRC_DATA] = %b'0',
;          1757          [3,SGL_DATA] = %b'0',
;          1758          [3,UNC_DATA] = %b'1',
;          1759          [3,AO_5] = %b'000000',
;          1760          [3,PO_5] = %b'000000',
;          1761          [3,ECA_DATA] = %b'0',
;          1762          [3,BO_5] = %b'111111',
;          1763          [4,EO_5] = %b'111111',
;          1764          [4,CO_5] = %b'000101',
;          1765          [4,CRC_DATA] = %b'0',
;          1766          [4,SGL_DATA] = %b'0',
;          1767          [4,UNC_DATA] = %b'1',
;          1768          [4,AO_5] = %b'111111',
;          1769          [4,PO_5] = %b'000000',
;          1770          [4,ECA_DATA] = %b'1',
;          1771          [4,BO_5] = %b'111111')volatile,
;          1772
;          1773  !
;          1774  !<BLF/FORMAT>
;          1775  !
;          1776      RH_ADD : volatile,                  !RH CONTROLLER BASE ADDRESS
;          1777      RH_TYP : volatile,                  !RH CONTROLLER TYPE
;          1778      RH_VEC : volatile,                  !RH CONTROLLER VECTOR ADDRESS
;          1779      ML_LUN : volatile,                  !ML LOGICAL UNIT NO.
;          1780      ML_DUT : volatile;                  !ML DRIVE NUMBER
;          1781
;          1782  !
;          1783  !<BLF/PAGE>
```

```
;ML4AD
;                    DECLARATION SECTION

                1784 !
                1785 EQUALS;
                1786 !
                1787 ! MACRO DEFINITIONS
                1788 !
                1789
                1790 macro
                1791 !
                1792 ! REGISTER NAMES:
                1793 !
              M 1794     MLCS1 =
                1795  .ML_REG [0,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 1
              M 1796     MLWC =
                1797  .ML_REG [1,REGISTER_ADD]%,          !WORD COUNT REGISTER
              M 1798     MLBA =
                1799  .ML_REG [2,REGISTER_ADD]%,          !UNIBUS ADDRESS REGISTER
              M 1800     MLDA =
                1801  .ML_REG [3,REGISTER_ADD]%,          !DESIRED ADDRESS REGISTER
              M 1802     MLCS2 =
                1803  .ML_REG [4,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 2
              M 1804     MLDS =
                1805  .ML_REG [5,REGISTER_ADD]%,          !DRIVE STATUS REGISTER
              M 1806     MLER =
                1807  .ML_REG [6,REGISTER_ADD]%,          !ERROR REGISTER
              M 1808     MLAS =
                1809  .ML_REG [7,REGISTER_ADD]%,          !ATTENTION SUMMARY REGISTER
              M 1810     MLLA =
                1811  .ML_REG [8,REGISTER_ADD]%,          !LOOK AHEAD REGISTER
              M 1812     MLPA =
                1813  .ML_REG [8,REGISTER_ADD]%,          !PROM ADDRESS REGISTER
              M 1814     MLDB =
                1815  .ML_REG [9,REGISTER_ADD]%,          !DATA BUFFER REGISTER
              M 1816     MLMR =
                1817  .ML_REG [10,REGISTER_ADD]%,         !MAINTENANCE REGISTER
              M 1818     MLDT =
                1819  .ML_REG [11,REGISTER_ADD]%,         !DRIVE TYPE REGISTER
              M 1820     MLSN =
                1821  .ML_REG [12,REGISTER_ADD]%,         !SERIAL NUMBER REGISTER
              M 1822     MLE1 =
                1823  .ML_REG [13,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 1
              M 1824     MLE2 =
                1825  .ML_REG [14,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 2
              M 1826     MLD1 =
                1827  .ML_REG [15,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 1
              M 1828     MLD2 =
                1829  .ML_REG [16,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 2
              M 1830     MLEE =
                1831  .ML_REG [17,REGISTER_ADD]%,         !ECC ERROR REGISTER
              M 1832     MLEL =
                1833  .ML_REG [18,REGISTER_ADD]%,         !ECC ERROR LCOATION REGISTER
              M 1834     MLPD =
                1835  .ML_REG [19,REGISTER_ADD]%,         !PROM DATA REGISTER
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;        M 1836      MLBAE =
;          1837     .ML_REG [20,REGISTER_ADD]%,          !BUS ADDRESS EXTENSION REGISTER
;        M 1838      MLCS3 =
;          1839     .ML_REG [21,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 3
;          1840     !
;          1841     ! BIT ASSIGNMENTS:
;          1842     !
;        M 1843      SC =
;          1844     (MLCS1)<15,1>%,                      !MLCS1 BIT ASSIGNMENTS
;        M 1845      TRE =
;          1846     (MLCS1)<14,1>%,
;        M 1847      MCPE =
;          1848     (MLCS1)<13,1>%,
;        M 1849      DVA =
;          1850     (MLCS1)<11,1>%,
;        M 1851      RDY =
;          1852     (MLCS1)<7,1>%,
;        M 1853      IE =
;          1854     (MLCS1)<6,1>%,
;        M 1855      GO =
;          1856     (MLCS1)<0,1>%,
;        M 1857      ML_FUNC =
;          1858     (MLCS1)<0,6>%,
;        M 1859      DLT =
;          1860     (MLCS2)<15,1>%,                      !MLCS2 BIT ASSIGNMENTS
;        M 1861      WCE =
;          1862     (MLCS2)<14,1>%,
;        M 1863      PE =
;          1864     (MLCS2)<13,1>%,
;        M 1865      NED =
;          1866     (MLCS2)<12,1>%,
;        M 1867      NEM =
;          1868     (MLCS2)<11,1>%,
;        M 1869      PGE =
;          1870     (MLCS2)<10,1>%,
;        M 1871      MXF =
;          1872     (MLCS2)<9,1>%,
;        M 1873      MDPE =
;          1874     (MLCS2)<8,1>%,
;        M 1875      ORDY =
;          1876     (MLCS2)<7,1>%,
;        M 1877      IRDY =
;          1878     (MLCS2)<6,1>%,
;        M 1879      CLR =
;          1880     (MLCS2)<5,1>%,
;        M 1881      PAT =
;          1882     (MLCS2)<4,1>%,
;        M 1883      BAI =
;          1884     (MLCS2)<3,1>%,
;        M 1885      DRV_NUM =
;          1886     (MLCS2)<0,3>%,
;        M 1887      ATTN =
```

```
436 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
437 ;                DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)
438
439 ;          1888    (MLDS)<15,1>%,               !MLDS BIT ASSIGNMENTS
440 ;        M 1889      COMP_ERR =
441 ;          1890    (MLDS)<14,1>%,
442 ;        M 1891      MOL =
443 ;          1892    (MLDS)<12,1>%,
444 ;        M 1893      LBT =
445 ;          1894    (MLDS)<10,1>%,
446 ;        M 1895      DPR =
447 ;          1896    (MLDS)<8,1>%,
448 ;        M 1897      DRY =
449 ;          1898    (MLDS)<7,1>%,
450 ;        M 1899      VV =
451 ;          1900    (MLDS)<6,1>%,
452 ;        M 1901      DCK =
453 ;          1902    (MLER)<15,1>%,               !MLER BIT ASSIGNMENTS
454 ;        M 1903      UNS =
455 ;          1904    (MLER)<14,1>%,
456 ;        M 1905      OPI =
457 ;          1906    (MLER)<13,1>%,
458 ;        M 1907      IAE =
459 ;          1908    (MLER)<10,1>%,
460 ;        M 1909      AOE =
461 ;          1910    (MLER)<9,1>%,
462 ;        M 1911      ECH_ERR =
463 ;          1912    (MLER)<6,1>%,
464 ;        M 1913      DPAR =
465 ;          1914    (MLER)<5,1>%,
466 ;        M 1915      CPAR =
467 ;          1916    (MLER)<3,1>%,
468 ;        M 1917      RMR =
469 ;          1918    (MLER)<2,1>%,
470 ;        M 1919      ILR =
471 ;          1920    (MLER)<1,1>%,
472 ;        M 1921      ILF =
473 ;          1922    (MLER)<0,1>%,
474 ;        M 1923      ARR_TYP =
475 ;          1924    (MLMR)<10,1>%,               !MLMR BIT ASSIGNMENTS
476 ;        M 1925      ML_NUM_ARR =
477 ;          1926    (MLMR)<11,5>%,
478 ;        M 1927      REF_MAR =
479 ;          1928    (MLMR)<7,1>%,
480 ;        M 1929      PROM_RW =
481 ;          1930    (MLMR)<6,1>%,
482 ;        M 1931      PROM_DIS =
483 ;          1932    (MLMR)<5,1>%,
484 ;        M 1933      DAT_CLK =
485 ;          1934    (MLMR)<4,1>%,
486 ;        M 1935      DAT_DM =
487 ;          1936    (MLMR)<3,1>%,
488 ;        M 1937      DCK_EN =
489 ;          1938    (MLMR)<2,1>%,
490 ;        M 1939      ECC_DIS =
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;          1940   (MLMR)<1,1>%,
;        M 1941      ECC_DM =
;          1942    (MLMR)<0,1>%,
;        M 1943      DRV_TYP =
;          1944    (MLDT)<0,1>%,                                 !MLDT BIT ASSIGNMENTS
;        M 1945      CRC_A =
;        M 1946                                          !MLE1 BIT ASSIGNMENTS
;          1947   (MLE1)<0,6>%,
;        M 1948      PAR_CRC_WRD =
;          1949   (MLE1)<8,6>%,
;        M 1950      CRC_B =
;        M 1951                                          !MLE2 BIT ASSIGNMENTS
;          1952   (MLE2)<0,6>%,
;        M 1953      UNC_ERR =
;          1954    (MLEE)<15,1>%,                                !MLEE BIT ASSIGNMENTS
;        M 1955      SGL_ERR =
;          1956    (MLEE)<14,1>%,
;        M 1957      CRC_ERR =
;          1958    (MLEE)<13,1>%,
;        M 1959      BIT_IN_ERR =
;          1960   (MLEE)<0,6>%,
;        M 1961      CHAN_IN_ERR =
;          1962   (MLEE)<6,6>%,
;          1963   !
;          1964   ! MISCELLANEOUS MACRO DEFINITIONS:
;          1965   !
;        M 1966      SN3 =
;          1967   (MLSN)<12,4>%,
;        M 1968      SN2 =
;          1969   (MLSN)<8,4>%,
;        M 1970      SN1 =
;          1971   (MLSN)<4,4>%,
;        M 1972      SN0 =
;          1973   (MLSN)<0,4>%,
;        M 1974      IS_SET =
;        M 1975                                          !TEST IF BIT IS EQUAL 1
;          1976   eql 1%,
;        M 1977      IS_NOT_SET =
;        M 1978                                          !TEST IF BIT IS EQUAL 0
;          1979   eql 0%,
;        M 1980      HI =
;        M 1981                                          !READS REGISTERS FORCED HI BITS FROM PERSONALITY TABLE
;          1982   ML_REG[.index,FORCE_HI]%,
;        M 1983      LO =
;        M 1984                                          !READS REGISTERS FORCED LO BITS FROM PERSONALITY TABLE
;          1985   ML_REG[.index,FORCE_LO]%,
;        M 1986      IGNORE =
;        M 1987                                          !READS REGISTERS DONT_CARE BITS FROM PERSONALITY TABLE
;          1988   ML_REG[.index,DONT_CARE]%,
;        M 1989      MLE2_MASK =
;        M 1990                                          !READS MLE2 DONT CARE MASK EITHER DATA DIAG OR ECC CIE REG
;          1991   ML_REG[14,DONT_CARE]%,
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;        M 1992      WRT_MASK =
;        M 1993                                          !GENERATE MASK DATA PATTERN USING REGISTER FORCE LO, HI AND IGNORE B
;          1994   .IGNORE or ((not .LO) and (.HI or .TST_PAT))%,
;        M 1995      CLR_MBUS =
;        M 1996                                          !CLEAR MASS BUS RESTORE DRIVE NUMBER
;          1997   CLR = ONE; DRV_NUM = .ML_DUT%,
;          1998   !<BLF/SYNONYM IS_SET = EQL 1 * >
;          1999   !<BLF/SYNONYM IS_NOT_SET = EQL 0 * >
;          2000   !
;          2001   ! DIAGNOSTIC DATA REGISTER MACROS
;          2002   !
;        M 2003      RD_LNG_WRD =
;        M 2004                                  !READ DATA DIAG REGS INTO BIND LOCATIONS
;        M 2005     D1_TEMP = .MLD1;
;        M 2006     D2_TEMP = .MLD2;
;          2007     E2_TEMP = .MLE2%,
;        M 2008      WRT_LNG_WRD =
;        M 2009                                  !LOADS DATA DIAG REG WITH CONTENTS OF BIND LOCATIONS
;        M 2010     MLD1 = .D1_TEMP;
;        M 2011     MLD2 = .D2_TEMP;
;          2012     MLE2 = .E2_TEMP%,
;        M 2013      TIME_OUT_LOOP =
;        M 2014                  !WAIT LOOP DIRING MASS BUS TRANSFER
;        M 2015          do
;        M 2016            0
;          2017          until .DRY;%,
;          2018   !
;          2019   ! ERROR PRINTING THRESHOLD MACROS
;          2020   !
;        M 2021      CLR_THRESHOLD =
;          2022   P_CNT = ZERO;%,
;        M 2023      CMP_THRESHOLD =
;        M 2024   P_CNT = .P_CNT + 1;
;        M 2025
;        M 2026   if .P_CNT gtr .LIMIT
;          2027   then exitloop;%;
;          2028
;          2029   !
;          2030   ! BIND DECLARATIONS
;          2031   !
;          2032
;          2033   bind
;          2034   !
;          2035   ! MANUAL INTERVENTION TEST ERROR AND OPERATOR PROMPT MESSAGES.
;          2036   ! TESTS 21 'POWER FAIL TEST' AND TEST 61 'BATTERY BACK-UP TEST'
;          2037   !
;          2038      T_21 = uplit (%asciz'********* MANUAL INTERVENTION TEST 21 POWER FAIL *********'),
;          2039      T_61 = uplit (%asciz'********* MANUAL INTERVENTION TEST 61 BATTERY BACK-UP *********'),
;          2040      PWR_OFF = uplit (%asciz'WITH BATTERY BACK-UP ON TURN BOX AC CIRCUIT BREAKER OFF'),
;          2041      PWR_ON = uplit (%asciz'WITH BATTERY BACK-UP OFF TURN BOX AC CIRCUIT BREAKER ON'),
;          2042      UNS_ERR = uplit (%asciz'UNS BIT NOT SET DURING AC POWER FAIL'),
;          2043      VV_NOT_SET = uplit (%asciz'VV BIT NOT SET AFTER RD_IN_PRESET FUNCTION'),
```

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;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;          2044      VV_CLEAR = uplit (%asciz'VV BIT CLEARED AFTER RD-IN-PRESET FUNCTION'),
;          2045      NO_INIT = uplit (%asciz'MEMORY NOT INITIALIZED AFTER POWER UP WITH BAD BATTERY BACK-UP'),
;          2046      MB_DIS_ERR = uplit (%asciz'REGISTERS NOT CLEARED BY MB_DIS AFTER POWER FAIL'),
;          2047      WC_ERR = uplit (%asciz'SC BIT SET DURING WRITE CHECK TRANSFER'),
;          2048      W_ERR = uplit (%asciz'SC BIT SET DURING WRITE TRANSFER'),
;          2049      VV_SET = uplit (%asciz'VV BIT STILL SET AFTER POWER LOSS WITH BAD BATTERY BACK-UP'),
;          2050      PUP_BB = uplit (%asciz'WITH BATTERY BACK-UP ON TURN BOX AC CIRCUIT BREAKER ON'),
;          2051      BB_VV_ERR = uplit (%asciz'VV BIT CLEARED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP'),
;          2052      BB_INIT_ERR = uplit (%asciz'MEMORY INITED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP'),
;          2053      BB_BB_ERR = uplit (%asciz'BATTERY BACK-UP FAILED TO MAINTAIN MEMORY INTEGRITY DURING POWER FAIL'),
;          2054  !
;          2055  ! ERROR DATA MAPPING FORMATS
;          2056  !
;          2057      FMT_1 = uplit (%asciz'%AEXPECTED: %O6%A    READ: %O6%N%N'),
;          2058      FMT_2 = uplit (%asciz'%AGOOD DATA: %O6%A    BAD DATA: %O6%A    XOR: %O6%N%N'),
;          2059      FMT_3 = uplit (%asciz'%ADRIVE SN: %O6%N%N'),
;          2060      FMT_4 = uplit (%asciz'%ABIT IN ERROR: %O6%N%N'),
;          2061      FMT_5 = uplit (%asciz'%AGOOD NIB DATA: %O2%A    BAD NIB DATA: %O2%A    NIB POS: %O4%N%N'),
;          2062      FMT_6 = uplit (%asciz'%ANIB IN ERROR: %D4%N%N'),
;          2063      FMT_7 = uplit (%asciz'%AFAILED AT: %O6%N%N'),
;          2064      FMT_8 = uplit (%asciz'%AREPLACE ARR MOD: %D2%N%N'),
;          2065      FMT_9 = uplit (%asciz'%AFAILED AT DSA: %O6%N%N'),
;          2066      FMT_10 = uplit (%asciz'%ABIT<15:10>: %B6%A    BIT<9:0>: %B10%N%N'),
;          2067      FMT_11 = uplit (%asciz'%AFAILING REG ADRS: %O6%N%N'),
;          2068      FMT_12 = uplit (%asciz'%AFAILING FUNC: %O6%N%N'),
;          2069      FMT_13 = uplit (%asciz' %AOFF_SET CNT FOR NIB : %D2 %A = %D2 %N%N'),
;          2070      FMT_14 = uplit (%asciz'%AWROTE: %D2%A    READ: %D2%N%N'),
;          2071      FMT_15 = uplit (%asciz'%ANIBBLES XFERED BEFORE ERROR: %D3%N'),
;          2072      FMT_16 = uplit (%asciz'%AFAILING REG: %O6%A GOOD DATA: %O6%A BAD DATA: %O6%N%N'),
;          2073      FMT_17 = uplit (%asciz'%N%ADIAGNOSING UNIT %O1%N%N'),
;          2074      FMT_18 = uplit (%asciz'%ATIMED OUT DURING MBUS %O2%A FUNC%N%N'),
;          2075      FMT_19 = uplit (%asciz'%ACRC GEN = B: %B6%A A: %B6%A P: %B6%N'),
;          2076      FMT_20 = uplit (%asciz'%ACRC CAL = B: %B6%A A: %B6%A P: %B6%N%N'),
;          2077      FMT_21 = uplit (%asciz'%AFAILED AT PLOG: %D2%A CHANNEL: %D2%N%N'),
;          2078      FMT_22 = uplit (%asciz'%AFAILED AT WRD: %D2%A BIT: %D2%N%N'),
;          2079      FMT_23 = uplit (%asciz'%AREGISTER%S3%AADDRESS%S7%ACONTENTS%N%N'),
;          2080      FMT_24 = uplit (%asciz'%S%T%S5%O6%S4%O16%N'),
;          2081      FMT_25 = uplit (%asciz'%S4%T%A:%S%O6%N'),
;          2082      FMT_26 = uplit (%asciz'%S4%T%A:%S%D1%D1%D1%D1%N'),
;          2083  !
;          2084  ! ERROR MESSAGE MAPPING FORMATS
;          2085  !
;          2086      ONE_FMT = uplit (%asciz'%T%N'),
;          2087      TWO_FMT = uplit (%asciz'%T%T%N'),
;          2088      THR_FMT = uplit (%asciz'%T%T%T%N'),
;          2089      FOR_FMT = uplit (%asciz'%T%T%T%T%N'),
;          2090      FIV_FMT = uplit (%asciz'%T%T%T%T%T%N'),
;          2091      SIX_FMT = uplit (%asciz'%T%T%T%T%T%T%N'),
;          2092      SEV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%N'),
;          2093      EIG_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%N'),
;          2094      NIN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%N'),
;          2095      TEN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%N'),
```

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;ML4AD
;                    DECLARATION SECTION

;          2096      ELV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%T%T%N'),
;          2097  !
;          2098  ! DIAGNOSTIC VOCABULARY
;          2099  !
;          2100  !
;          2101  ! WORDS
;          2102  !
;          2103      WRD_1 = uplit (%asciz' GO'),
;          2104      WRD_2 = uplit (%asciz' DRV_RDY'),
;          2105      WRD_3 = uplit (%asciz' ILF'),
;          2106      WRD_4 = uplit (%asciz' OPI'),
;          2107      WRD_5 = uplit (%asciz' BAD'),
;          2108      WRD_6 = uplit (%asciz' GOOD'),
;          2109      WRD_7 = uplit (%asciz' PARITY NOT'),
;          2110      WRD_8 = uplit (%asciz' GENERATED'),
;          2111      WRD_9 = uplit (%asciz' DETECTED'),
;          2112      WRD_10 = uplit (%asciz' ERROR'),
;          2113      WRD_11 = uplit (%asciz' AFTER'),
;          2114      WRD_12 = uplit (%asciz' DURING'),
;          2115      WRD_13 = uplit (%asciz' AT'),
;          2116      WRD_14 = uplit (%asciz' FAILURE'),
;          2117      WRD_15 = uplit (%asciz' ATA'),
;          2118      WRD_16 = uplit (%asciz' ATTN'),
;          2119      WRD_17 = uplit (%asciz' WRITING'),
;          2120      WRD_18 = uplit (%asciz' VV'),
;          2121      WRD_19 = uplit (%asciz' FUNC'),
;          2122      WRD_20 = uplit (%asciz' TRE'),
;          2123      WRD_21 = uplit (%asciz' RMR'),
;          2124      WRD_22 = uplit (%asciz' EXCESSIVE'),
;          2125      WRD_23 = uplit (%asciz' MBUS'),
;          2126      WRD_24 = uplit (%asciz' DATA'),
;          2127      WRD_25 = uplit (%asciz' CONTINUITY'),
;          2128      WRD_26 = uplit (%asciz' ADE'),
;          2129      WRD_27 = uplit (%asciz' LBT'),
;          2130      WRD_29 = uplit (%asciz' PREMATURLY'),
;          2131      WRD_30 = uplit (%asciz' IAE'),
;          2132      WRD_31 = uplit (%asciz' INCREMENT'),
;          2133      WRD_32 = uplit (%asciz' WITH'),
;          2134      WRD_33 = uplit (%asciz' UV'),
;          2135      WRD_34 = uplit (%asciz' UNS'),
;          2136      WRD_35 = uplit (%asciz' PROM'),
;          2137      WRD_36 = uplit (%asciz' OR'),
;          2138      WRD_37 = uplit (%asciz' SELECT'),
;          2139      WRD_38 = uplit (%asciz' REG'),
;          2140      WRD_39 = uplit (%asciz' UNIQUE'),
;          2141      WRD_40 = uplit (%asciz' 14'),
;          2142      WRD_41 = uplit (%asciz' NIBBLE CNT'),
;          2143      WRD_42 = uplit (%asciz' GTR'),
;          2144      WRD_43 = uplit (%asciz' WHILE'),
;          2145      WRD_44 = uplit (%asciz' TRE'),
;          2146      WRD_45 = uplit (%asciz' INITIAL'),
;          2147      WRD_46 = uplit (%asciz' OFF_SET'),
```

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716 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
717 ;                DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)
718 ;
719 ;          2148      WRD_47 = uplit (%asciz' COUNT'),
720 ;          2149      WRD_48 = uplit (%asciz' DELAY'),
721 ;          2150      WRD_49 = uplit (%asciz' TESTS'),
722 ;          2151      WRD_50 = uplit (%asciz' ADRS'),
723 ;          2152      WRD_51 = uplit (%asciz' COUNTER'),
724 ;          2153      WRD_52 = uplit (%asciz' REG'),
725 ;          2154      WRD_53 = uplit (%asciz' TESTED'),
726 ;          2155      WRD_54 = uplit (%asciz' NIBBLE'),
727 ;          2156      WRD_55 = uplit (%asciz' ALL'),
728 ;          2157      WRD_56 = uplit (%asciz' TEST'),
729 ;          2158      WRD_57 = uplit (%asciz' XFERED'),
730 ;          2159      WRD_58 = uplit (%asciz' NIBBLES'),
731 ;          2160      WRD_59 = uplit (%asciz' SC'),
732 ;          2161      WRD_60 = uplit (%asciz' MULTIPLEXER'),
733 ;          2162      WRD_61 = uplit (%asciz' UNEXPECTED'),
734 ;          2163      WRD_62 = uplit (%asciz' NED'),
735 ;          2164      WRD_63 = uplit (%asciz' ILR'),
736 ;          2165      WRD_64 = uplit (%asciz' CRC'),
737 ;          2166      WRD_65 = uplit (%asciz' SGL'),
738 ;          2167      WRD_67 = uplit (%asciz' ECH'),
739 ;          2168      WRD_68 = uplit (%asciz'UNC'),
740 ;          2169      WRD_69 = uplit (%asciz' BIT'),
741 ;          2170      WRD_70 = uplit (%asciz' CHANNEL'),
742 ;          2171      WRD_71 = uplit (%asciz' LATCH'),
743 ;          2172      WRD_72 = uplit (%asciz' DCK'),
744 ;          2173      WRD_73 = uplit (%asciz' BUS'),
745 ;          2174      WRD_74 = uplit (%asciz' SYNDROME'),
746 ;          2175      WRD_75 = uplit (%asciz' DECODE'),
747 ;          2176      WRD_76 = uplit (%asciz' NOT'),
748 ;          2177      WRD_77 = uplit (%asciz' UNCORRECTABLE'),
749 ;          2178
750 ;          2179      ! PHRASES
751 ;          2180      !
752 ;          2181      PHR_1 = uplit (%asciz' BIT NOT SET'),
753 ;          2182      PHR_2 = uplit (%asciz' BIT NOT CLR'),
754 ;          2183      PHR_3 = uplit (%asciz' NO RESPONCE AFTER 1.5 US'),
755 ;          2184      PHR_4 = uplit (%asciz' DATA ERRORS'),
756 ;          2185      PHR_5 = uplit (%asciz' BIT SET'),
757 ;          2186      PHR_6 = uplit (%asciz' BIT CLR'),
758 ;          2187      PHR_7 = uplit (%asciz' OF OTHER DRIVES'),
759 ;          2188      PHR_8 = uplit (%asciz' CLASS A'),
760 ;          2189      PHR_9 = uplit (%asciz' CLASS B'),
761 ;          2190      PHR_10 = uplit (%asciz' TO FIND'),
762 ;          2191      PHR_11 = uplit (%asciz' NOT LATCHED'),
763 ;          2192      PHR_12 = uplit (%asciz' SINGLE BIT ERROR'),
764 ;          2193      PHR_13 = uplit (%asciz' MULTIPLE BIT ERROR'),
765 ;          2194      PHR_14 = uplit (%asciz'          REGISTER   DUMP'),
766 ;          2195      PHR_15 = uplit (%asciz'SERIAL #'),
767 ;          2196      !
768 ;          2197      ! FUNCTIONS
769 ;          2198      !
770 ;          2199      FNC_1 = uplit (%asciz' MEM SIZING'),
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (3)

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;ML4AD
;                    DECLARATION SECTION

;          2200      FNC_2 = uplit (%asciz' NOOP'),
;          2201      FNC_3 = uplit (%asciz' DRV'),
;          2202      FNC_4 = uplit (%asciz' WRITE CHECK'),
;          2203      FNC_5 = uplit (%asciz' WRITE'),
;          2204      FNC_6 = uplit (%asciz' READ'),
;          2205      FNC_7 = uplit (%asciz' CLEAR'),
;          2206      FNC_8 = uplit (%asciz' COMP ERROR'),
;          2207      FNC_9 = uplit (%asciz' SYS CLR'),
;          2208      FNC_10 = uplit (%asciz' SEARCH'),
;          2209      FNC_11 = uplit (%asciz' READ-IN-PRESET'),
;          2210      FNC_12 = uplit (%asciz' ILLEGAL'),
;          2211      FNC_13 = uplit (%asciz' ABORT'),
;          2212      FNC_14 = uplit (%asciz' ARR RD_WRT'),
;          2213      FNC_15 = uplit (%asciz' GOOD BLK'),
;          2214      FNC_16 = uplit (%asciz' REFRESH'),
;          2215      FNC_17 = uplit (%asciz' ARRAY'),
;          2216      FNC_18 = uplit (%asciz' RAM-BUS'),
;          2217      FNC_19 = uplit (%asciz' OVERFLOW'),
;          2218      FNC_21 = uplit (%asciz' CHK_SUM'),
;          2219      FNC_22 = uplit (%asciz' LAST BLK'),
;          2220      FNC_23 = uplit (%asciz' INITIALIZE'),
;          2221      !
;          2222      ! REGISTERS
;          2223      !
;          2224      REG_1 = uplit (%asciz' MLCS1'),
;          2225      REG_2 = uplit (%asciz' MLDS'),
;          2226      REG_3 = uplit (%asciz' MLER'),
;          2227      REG_4 = uplit (%asciz' MLMR'),
;          2228      REG_5 = uplit (%asciz' MLAS'),
;          2229      REG_6 = uplit (%asciz' MLDA'),
;          2230      REG_7 = uplit (%asciz' MLDT'),
;          2231      REG_8 = uplit (%asciz' MLPA'),
;          2232      REG_9 = uplit (%asciz' MLSN'),
;          2233      REG_10 = uplit (%asciz' MLE1'),
;          2234      REG_11 = uplit (%asciz' MLE2'),
;          2235      REG_12 = uplit (%asciz' MLD1'),
;          2236      REG_13 = uplit (%asciz' MLD2'),
;          2237      REG_14 = uplit (%asciz' MLEE'),
;          2238      REG_15 = uplit (%asciz' MLEL'),
;          2239      REG_16 = uplit (%asciz' MLPD'),
;          2240      REG_17 = uplit (%asciz' MLCS2'),
;          2241      REG_18 = uplit (%asciz' MLWC'),
;          2242      REG_19 = uplit (%asciz' MLBA'),
;          2243      REG_20 = uplit (%asciz' MLBAI'),
;          2244      REG_21 = uplit (%asciz' MLCS3'),
;          2245      !
;          2246      ! MODULES IN ERROR MESSAGES
;          2247      !
;          2248      ASYNC = uplit (%asciz'ASYNCHRONOUS FAILURE MODULE 7361'),
;          2249      SYNC = uplit (%asciz'SYNCHRONOUS FAILURE MODULE 7362 '),
;          2250      ARR_DAT = uplit (%asciz'ARRAY DATA FAILURE MODULE 7363 '),
;          2251      MEM_ARR = uplit (%asciz'MEMORY ARRAY FAILURE MODULE 7357'),
```

```
828 ;ML4AD
829 ;                   DECLARATION SECTION
830
831 ;          2252         INTER = uplit (%asciz'INTERMEDIATE DIAGNOSTIC MESSAGE'),
832 ;          2253         DATA_LATE = uplit (%asciz'DATA LATE ERROR DURING TRANSFER'),
833 ;          2254         SC_SET = uplit (%asciz'SC BIT SET DURING TRANSFER'),
834 ;          2255         TRBLE_LOOP = uplit (%asciz'TROUBLE SHOOT LOOP ERRORS'),
835 ;          2256         RH_ERROR = uplit (%asciz'RH CONTROLLER ERRORS'),
836 ;          2257         TIME_OUT = uplit (%asciz'DRIVE HUNG AFTER MASS BUS TRANSFER'),
837 ;          2258     !
838 ;          2259     ! DATA DIAGNOSTIC REGISTER SAVE LOCATIONS
839 ;          2260     !
840 ;          2261         D1_TEMP = NIB_SAVE,
841 ;          2262         D2_TEMP = NIB_SAVE [1, 0, 16, 0],
842 ;          2263         E2_TEMP = NIB_SAVE [2, 0, 16, 0];
843 ;          2264
844 ;          2265     %SBTTL 'ROUTINE DECLARATION SECTION'
845 ;          2266
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (4)

;        2267  routine LOAD_STACK (STK_PTR, NIB_PTR) : novalue =
;        2268      begin
;        2269
;        2270  !++
;        2271  ! FUNCTIONAL DESCRIPTION:
;        2272  !       LOAD STACK TAKES GOOD NIBBLE DATA
;        2273  !       FOUND IN THE STRUCTURE 'NIB_SAVE'
;        2274  !       AND STORES IT INTO THE STRUCTURE
;        2275  !       'STACK' REWRITING ANY BAD NIBBLE
;        2276  !       'STACK' LOCATIONS WITH GOOD NIBBLE
;        2277  !       DATA
;        2278  !
;        2279  ! FORMAL PARAMETERS:
;        2280  ! STK_PTR
;        2281  !       POINTS TO PRESENT DEPTH OF THE
;        2282  !       'STACK' WHERE PRESENT GOOD NIBBLE
;        2283  !       DATA IS TO BE STORED.
;        2284  !
;        2285  ! NIB_PTR
;        2286  !       POINTS TO CURRENT NIBBLE POSITION BEING
;        2287  !       MANIPULATED.
;        2288  !
;        2289  ! IMPLICIT INPUTS:
;        2290  ! STACK
;        2291  !       VECTOR OF 198 BYTE LOCATIONS WHERE
;        2292  !       GOOD NIBBLE DATA IS STORED
;        2293  !       DURING DIAGNOSTIC MODE READS, AFTER
;        2294  !       BAD NIBBLE LOCATIONS HAVE BEEN
;        2295  !       STRIPPED AWAY.
;        2296  !
;        2297  ! STK_OFF
;        2298  !
;        2299  !    vector of 9 byte LOCATIONS WHICH
;        2300  !       STORES AWAY A BAD NIBBLE OFF SET
;        2301  !       COUNT FOR EACH NIBBLE POSITION
;        2302  !
;        2303  ! NIB_SAVE
;        2304  !       BLOCK OF 3 WORDS TO STORE THE
;        2305  !       DATA FOUND IN MLD1, MLD2 AND
;        2306  !       MLE2 AFTER A DIAGNOSTIC MODE READ.
;        2307  !
;        2308  ! IMPLICIT OUTPUTS:
;        2309  !       'STACK' LOADED WITH GOOD NIBBLE
;        2310  !       DATA
;        2311  !
;        2312  ! COMPLETETION CODES:   NONE
;        2313  !
;        2314  ! SIDE EFFECTS:         NONE
;        2315  !
;        2316  !--
;        2317
;        2318      case .NIB_PTR from 0 to 9 of              !SELECT NIBBLE DATA TO BE LOADED INTO THE STACK
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (4)

;                    set

;                    [0] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_0];
;                                                                !LOAD NIBBLE DATA 0 INTO SELECTED STACK LOCATION

;                    [1] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_1];
;                                                                !LOAD NIBBLE DATA 1 INTO SELECTED STACK LOCATION

;                    [2] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_2];
;                                                                !LOAD NIBBLE DATA 2 INTO SELECTED STACK LOCATION

;                    [3] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_3];
;                                                                !LOAD NIBBLE DATA 3 INTO SELECTED STACK LOCATION

;                    [4] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_4];
;                                                                !LOAD NIBBLE DATA 4 INTO SELECTED STACK LOCATION

;                    [5] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_5];
;                                                                !LOAD NIBBLE DATA 5 INTO SELECTED STACK LOCATION

;                    [6] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_6];
;                                                                !LOAD NIBBLE DATA 6 INTO SELECTED STACK LOCATION

;                    [7] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_7];
;                                                                !LOAD NIBBLE DATA 7 INTO SELECTED STACK LOCATION

;                    [8] :
;                        stack [ .STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_8];
;                                                                !LOAD NIBBLE DATA 8 INTO SELECTED STACK LOCATION

;                    [9] :
;                        stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_9];
;                                                                !LOAD NIBBLE DATA 9 INTO SELECTED STACK LOCATION

;                    tes;

;                end;
```

```
                                                                                29-Mar-1982 16:23:04    TOPS
                                                                                29-Mar-1982 16:21:03    PA:<
                                ;ML4AD
                                ;                       ROUTINE DECLARATION SECTION
                                
004716  052     052     052     P.AAA:  .ASCII  /***/
004721  052     052     052             .ASCII  /***/
004724  052     052     052             .ASCII  /***/
004727  040     115     101             .ASCII  / MA/
004732  116     125     101             .ASCII  /NUA/
004735  114     040     111             .ASCII  /L I/
004740  116     124     105             .ASCII  /NTE/
004743  122     126     105             .ASCII  /RVE/
004746  116     124     111             .ASCII  /NTI/
004751  117     116     040             .ASCII  /ON /
004754  124     105     123             .ASCII  /TES/
004757  124     040     062             .ASCII  /T 2/
004762  061     040     120             .ASCII  /1 P/
004765  117     127     105             .ASCII  /OWE/
004770  122     040     106             .ASCII  /R F/
004773  101     111     114             .ASCII  /AIL/
004776  040     052     052             .ASCII  / **/
005001  052     052     052             .ASCII  /***/
005004  052     052     052             .ASCII  /***/
005007  052     000     000             .ASCII  /*/<00><00>
005012  052     052     052     P.AAB:  .ASCII  /***/
005015  052     052     052             .ASCII  /***/
005020  052     052     052             .ASCII  /***/
005023  040     115     101             .ASCII  / MA/
005026  116     125     101             .ASCII  /NUA/
005031  114     040     111             .ASCII  /L I/
005034  116     124     105             .ASCII  /NTE/
005037  122     126     105             .ASCII  /RVE/
005042  116     124     111             .ASCII  /NTI/
005045  117     116     040             .ASCII  /ON /
005050  124     105     123             .ASCII  /TES/
005053  124     040     066             .ASCII  /T 6/
005056  061     040     102             .ASCII  /1 B/
005061  101     124     124             .ASCII  /ATT/
005064  105     122     131             .ASCII  /ERY/
005067  040     102     101             .ASCII  / BA/
005072  103     113     055             .ASCII  /CK-/
005075  125     120     040             .ASCII  /UP /
005100  052     052     052             .ASCII  /***/
005103  052     052     052             .ASCII  /***/
005106  052     052     052             .ASCII  /***/
005111  000                             .ASCII  <00>
005112  127     111     124     P.AAC:  .ASCII  /WIT/
005115  110     040     102             .ASCII  /H B/
005120  101     124     124             .ASCII  /ATT/
005123  105     122     131             .ASCII  /ERY/
005126  040     102     101             .ASCII  / BA/
005131  103     113     055             .ASCII  /CK-/
005134  125     120     040             .ASCII  /UP /
005137  117     116     040             .ASCII  /ON /
005142  124     125     122             .ASCII  /TUR/
005145  116     040     102             .ASCII  /N B/
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

005150    117    130    040                .ASCII  /OX /
005153    101    103    040                .ASCII  /AC /
005156    103    111    122                .ASCII  /CIR/
005161    103    125    111                .ASCII  /CUI/
005164    124    040    102                .ASCII  /T B/
005167    122    105    101                .ASCII  /REA/
005172    113    105    122                .ASCII  /KER/
005175    040    117    106                .ASCII  / OF/
005200    106    000                       .ASCII  /F/<00>
005202    127    111    124    P.AAD:      .ASCII  /WIT/
005205    110    040    102                .ASCII  /H B/
005210    101    124    124                .ASCII  /ATT/
005213    105    122    131                .ASCII  /ERY/
005216    040    102    101                .ASCII  / BA/
005221    103    113    055                .ASCII  /CK-/
005224    125    120    040                .ASCII  /UP /
005227    117    106    106                .ASCII  /OFF/
005232    040    124    125                .ASCII  / TU/
005235    122    116    040                .ASCII  /RN /
005240    102    117    130                .ASCII  /BOX/
005243    040    101    103                .ASCII  / AC/
005246    040    103    111                .ASCII  / CI/
005251    122    103    125                .ASCII  /RCU/
005254    111    124    040                .ASCII  /IT /
005257    102    122    105                .ASCII  /BRE/
005262    101    113    105                .ASCII  /AKE/
005265    122    040    117                .ASCII  /R O/
005270    116    000                       .ASCII  /N/<00>
005272    125    116    123    P.AAE:      .ASCII  /UNS/
005275    040    102    111                .ASCII  / BI/
005300    124    040    116                .ASCII  /T N/
005303    117    124    040                .ASCII  /OT /
005306    123    105    124                .ASCII  /SET/
005311    040    104    125                .ASCII  / DU/
005314    122    111    116                .ASCII  /RIN/
005317    107    040    101                .ASCII  /G A/
005322    103    040    120                .ASCII  /C P/
005325    117    127    105                .ASCII  /OWE/
005330    122    040    106                .ASCII  /R F/
005333    101    111    114                .ASCII  /AIL/
005336    000    000                       .ASCII  <00><00>
005340    126    126    040    P.AAF:      .ASCII  /VV /
005343    102    111    124                .ASCII  /BIT/
005346    040    116    117                .ASCII  / NO/
005351    124    040    123                .ASCII  /T S/
005354    105    124    040                .ASCII  /ET /
005357    101    106    124                .ASCII  /AFT/
005362    105    122    040                .ASCII  /ER /
005365    122    104    137                .ASCII  /RD_/
005370    111    116    137                .ASCII  /IN_/
005373    120    122    105                .ASCII  /PRE/
005376    123    105    124                .ASCII  /SET/
```

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                                                                                29-Mar-1982 16:23:04    TOPS
                                                                                29-Mar-1982 16:21:03    PA:<
1069                                    ;ML4AD
1070                                    ;               ROUTINE DECLARATION SECTION
1071
1072 005401    040     106     125             .ASCII  / FU/
1073 005404    116     103     124             .ASCII  /NCT/
1074 005407    111     117     116             .ASCII  /ION/
1075 005412    000     000                     .ASCII  <00><00>
1076 005414    126     126     040     P.AAG:  .ASCII  /VV /
1077 005417    102     111     124             .ASCII  /BIT/
1078 005422    040     103     114             .ASCII  / CL/
1079 005425    105     101     122             .ASCII  /EAR/
1080 005430    105     104     040             .ASCII  /ED /
1081 005433    101     106     124             .ASCII  /AFT/
1082 005436    105     122     040             .ASCII  /ER /
1083 005441    122     104     055             .ASCII  /RD-/
1084 005444    111     116     055             .ASCII  /IN-/
1085 005447    120     122     105             .ASCII  /PRE/
1086 005452    123     105     124             .ASCII  /SET/
1087 005455    040     106     125             .ASCII  / FU/
1088 005460    116     103     124             .ASCII  /NCT/
1089 005463    111     117     116             .ASCII  /ION/
1090 005466    000     000                     .ASCII  <00><00>
1091 005470    115     105     115     P.AAH:  .ASCII  /MEM/
1092 005473    117     122     131             .ASCII  /ORY/
1093 005476    040     116     117             .ASCII  / NO/
1094 005501    124     040     111             .ASCII  /T I/
1095 005504    116     111     124             .ASCII  /NIT/
1096 005507    111     101     114             .ASCII  /IAL/
1097 005512    111     132     105             .ASCII  /IZE/
1098 005515    104     040     101             .ASCII  /D A/
1099 005520    106     124     105             .ASCII  /FTE/
1100 005523    122     040     120             .ASCII  /R P/
1101 005526    117     127     105             .ASCII  /OWE/
1102 005531    122     040     125             .ASCII  /R U/
1103 005534    120     040     127             .ASCII  /P W/
1104 005537    111     124     110             .ASCII  /ITH/
1105 005542    040     102     101             .ASCII  / BA/
1106 005545    104     040     102             .ASCII  /D B/
1107 005550    101     124     124             .ASCII  /ATT/
1108 005553    105     122     131             .ASCII  /ERY/
1109 005556    040     102     101             .ASCII  / BA/
1110 005561    103     113     055             .ASCII  /CK-/
1111 005564    125     120     000             .ASCII  /UP/<00>
1112 005567    000                             .ASCII  <00>
1113 005570    122     105     107     P.AAI:  .ASCII  /REG/
1114 005573    111     123     124             .ASCII  /IST/
1115 005576    105     122     123             .ASCII  /ERS/
1116 005601    040     116     117             .ASCII  / NO/
1117 005604    124     040     103             .ASCII  /T C/
1118 005607    114     105     101             .ASCII  /LEA/
1119 005612    122     105     104             .ASCII  /RED/
1120 005615    040     102     131             .ASCII  / BY/
1121 005620    040     115     102             .ASCII  / MB/
1122 005623    137     104     111             .ASCII  / DI/
1123 005626    123     040     101             .ASCII  /S A/
```

```
1125                                    ;ML4AD
1126                                    ;               ROUTINE DECLARATION SECTION
1127
1128 005631  106  124  105             .ASCII  /FTE/
1129 005634  122  040  120             .ASCII  /R P/
1130 005637  117  127  105             .ASCII  /OWE/
1131 005642  122  040  106             .ASCII  /R F/
1132 005645  101  111  114             .ASCII  /AIL/
1133 005650  000  000                  .ASCII  <00><00>
1134 005652  123  103  040  P.AAJ:     .ASCII  /SC /
1135 005655  102  111  124             .ASCII  /BIT/
1136 005660  040  123  105             .ASCII  / SE/
1137 005663  124  040  104             .ASCII  /T D/
1138 005666  125  122  111             .ASCII  /URI/
1139 005671  116  107  040             .ASCII  /NG /
1140 005674  127  122  111             .ASCII  /WRI/
1141 005677  124  105  040             .ASCII  /TE /
1142 005702  103  110  105             .ASCII  /CHE/
1143 005705  103  113  040             .ASCII  /CK /
1144 005710  124  122  101             .ASCII  /TRA/
1145 005713  116  123  106             .ASCII  /NSF/
1146 005716  105  122  000             .ASCII  /ER/<00>
1147 005721  000                       .ASCII  <00>
1148 005722  123  103  040  P.AAK:     .ASCII  /SC /
1149 005725  102  111  124             .ASCII  /BIT/
1150 005730  040  123  105             .ASCII  / SE/
1151 005733  124  040  104             .ASCII  /T D/
1152 005736  125  122  111             .ASCII  /URI/
1153 005741  116  107  040             .ASCII  /NG /
1154 005744  127  122  111             .ASCII  /WRI/
1155 005747  124  105  040             .ASCII  /TE /
1156 005752  124  122  101             .ASCII  /TRA/
1157 005755  116  123  106             .ASCII  /NSF/
1158 005760  105  122  000             .ASCII  /ER/<00>
1159 005763  000                       .ASCII  <00>
1160 005764  126  126  040  P.AAL:     .ASCII  /VV /
1161 005767  102  111  124             .ASCII  /BIT/
1162 005772  040  123  124             .ASCII  / ST/
1163 005775  111  114  114             .ASCII  /ILL/
1164 006000  040  123  105             .ASCII  / SE/
1165 006003  124  040  101             .ASCII  /T A/
1166 006006  106  124  105             .ASCII  /FTE/
1167 006011  122  040  120             .ASCII  /R P/
1168 006014  117  127  105             .ASCII  /OWE/
1169 006017  122  040  114             .ASCII  /R L/
1170 006022  117  123  123             .ASCII  /OSS/
1171 006025  040  127  111             .ASCII  / WI/
1172 006030  124  110  040             .ASCII  /TH /
1173 006033  102  101  104             .ASCII  /BAD/
1174 006036  040  102  101             .ASCII  / BA/
1175 006041  124  124  105             .ASCII  /TTE/
1176 006044  122  131  040             .ASCII  /RY /
1177 006047  102  101  103             .ASCII  /BAC/
1178 006052  113  055  125             .ASCII  /K-U/
1179 006055  120  000  000             .ASCII  /P/<00><00>
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<

006060    127    111    124  P.AAM:  .ASCII  /WIT/
006063    110    040    102          .ASCII  /H B/
006066    101    124    124          .ASCII  /ATT/
006071    105    122    131          .ASCII  /ERY/
006074    040    102    101          .ASCII  / BA/
006077    103    113    055          .ASCII  /CK-/
006102    125    120    040          .ASCII  /UP /
006105    117    116    040          .ASCII  /ON /
006110    124    125    122          .ASCII  /TUR/
006113    116    040    102          .ASCII  /N B/
006116    117    130    040          .ASCII  /OX /
006121    101    103    040          .ASCII  /AC /
006124    103    111    122          .ASCII  /CIR/
006127    103    125    111          .ASCII  /CUI/
006132    124    040    102          .ASCII  /T B/
006135    122    105    101          .ASCII  /REA/
006140    113    105    122          .ASCII  /KER/
006143    040    117    116          .ASCII  / ON/
006146    000    000                 .ASCII  <00><00>
006150    126    126    040  P.AAN:  .ASCII  /VV /
006153    102    111    124          .ASCII  /BIT/
006156    040    103    114          .ASCII  / CL/
006161    105    101    122          .ASCII  /EAR/
006164    105    104    040          .ASCII  /ED /
006167    101    106    124          .ASCII  /AFT/
006172    105    122    040          .ASCII  /ER /
006175    120    117    127          .ASCII  /POW/
006200    105    122    040          .ASCII  /ER /
006203    106    101    111          .ASCII  /FAI/
006206    114    040    127          .ASCII  /L W/
006211    111    124    110          .ASCII  /ITH/
006214    040    107    117          .ASCII  / GO/
006217    117    104    040          .ASCII  /OD /
006222    102    101    124          .ASCII  /BAT/
006225    124    105    122          .ASCII  /TER/
006230    131    040    102          .ASCII  /Y B/
006233    101    103    113          .ASCII  /ACK/
006236    055    125    120          .ASCII  /-UP/
006241    000                        .ASCII  <00>
006242    115    105    115  P.AAO:  .ASCII  /MEM/
006245    117    122    131          .ASCII  /ORY/
006250    040    111    116          .ASCII  / IN/
006253    111    124    105          .ASCII  /ITE/
006256    104    040    101          .ASCII  /D A/
006261    106    124    105          .ASCII  /FTE/
006264    122    040    120          .ASCII  /R P/
006267    117    127    105          .ASCII  /OWE/
006272    122    040    106          .ASCII  /R F/
006275    101    111    114          .ASCII  /AIL/
006300    040    127    111          .ASCII  / WI/
006303    124    110    040          .ASCII  /TH /
006306    107    117    117          .ASCII  /GOO/
```

```
1237                                    ;ML4AD
1238                                    ;           ROUTINE DECLARATION SECTION
1239
1240 006311  104  040  102             .ASCII  /D B/
1241 006314  101  124  124             .ASCII  /ATT/
1242 006317  105  122  131             .ASCII  /ERY/
1243 006322  040  102  101             .ASCII  / BA/
1244 006325  103  113  055             .ASCII  /CK-/
1245 006330  125  120  000             .ASCII  /UP/<00>
1246 006333  000                       .ASCII  <00>
1247 006334  102  101  124  P.AAP:     .ASCII  /BAT/
1248 006337  124  105  122             .ASCII  /TER/
1249 006342  131  040  102             .ASCII  /Y B/
1250 006345  101  103  113             .ASCII  /ACK/
1251 006350  055  125  120             .ASCII  /-UP/
1252 006353  040  106  101             .ASCII  / FA/
1253 006356  111  114  105             .ASCII  /ILE/
1254 006361  104  040  124             .ASCII  /D T/
1255 006364  117  040  115             .ASCII  /O M/
1256 006367  101  111  116             .ASCII  /AIN/
1257 006372  124  101  111             .ASCII  /TAI/
1258 006375  116  040  115             .ASCII  /N M/
1259 006400  105  115  117             .ASCII  /EMO/
1260 006403  122  131  040             .ASCII  /RY /
1261 006406  111  116  124             .ASCII  /INT/
1262 006411  105  107  122             .ASCII  /EGR/
1263 006414  111  124  131             .ASCII  /ITY/
1264 006417  040  104  125             .ASCII  / DU/
1265 006422  122  111  116             .ASCII  /RIN/
1266 006425  107  040  120             .ASCII  /G P/
1267 006430  117  127  105             .ASCII  /OWE/
1268 006433  122  040  106             .ASCII  /R F/
1269 006436  101  111  114             .ASCII  /AIL/
1270 006441  000                       .ASCII  <00>
1271 006442  045  101  105  P.AAQ:     .ASCII  /%AE/
1272 006445  130  120  105             .ASCII  /XPE/
1273 006450  103  124  105             .ASCII  /CTE/
1274 006453  104  072  040             .ASCII  /D: /
1275 006456  045  117  066             .ASCII  /%06/
1276 006461  045  101  040             .ASCII  /%A /
1277 006464  040  040  040             .ASCII  /   /
1278 006467  122  105  101             .ASCII  /REA/
1279 006472  104  072  040             .ASCII  /D: /
1280 006475  045  117  066             .ASCII  /%06/
1281 006500  045  116  045             .ASCII  /%N%/
1282 006503  116  000  000  P.AAR:     .ASCII  /N/<00><00>
1283 006506  045  101  107             .ASCII  /%AG/
1284 006511  117  117  104             .ASCII  /OOD/
1285 006514  040  104  101             .ASCII  / DA/
1286 006517  124  101  072             .ASCII  /TA:/
1287 006522  040  045  117             .ASCII  / %O/
1288 006525  066  045  101             .ASCII  /6%A/
1289 006530  040  040  040             .ASCII  /   /
1290 006533  040  102  101             .ASCII  / BA/
1291 006536  104  040  104             .ASCII  /D D/
```

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1293                                    ;ML4AD                          29-Mar-1982 16:23:04    TOPS
1294                                    :       ROUTINE DECLARATION SECTION  29-Mar-1982 16:21:03    PA:<
1295
1296 006541  101  124  101             .ASCII  /ATA/
1297 006544  072  040  045             .ASCII  /: %/
1298 006547  117  066  045             .ASCII  /06%/
1299 006552  101  040  040             .ASCII  /A  /
1300 006555  040  040  130             .ASCII  /  X/
1301 006560  117  122  072             .ASCII  /OR:/
1302 006563  040  045  117             .ASCII  / %O/
1303 006566  066  045  116             .ASCII  /6%N/
1304 006571  045  116  000             .ASCII  /%N/<00>
1305 006574  045  101  104  P.AAS:     .ASCII  /%AD/
1306 006577  122  111  126             .ASCII  /RIV/
1307 006602  105  040  123             .ASCII  /E S/
1308 006605  116  072  040             .ASCII  /N: /
1309 006610  045  117  066             .ASCII  /%06/
1310 006613  045  116  045             .ASCII  /%N%/
1311 006616  116  000                  .ASCII  /N/<00>
1312 006620  045  101  102  P.AAT:     .ASCII  /%AB/
1313 006623  111  124  040             .ASCII  /IT /
1314 006626  111  116  040             .ASCII  /IN /
1315 006631  105  122  122             .ASCII  /ERR/
1316 006634  117  122  072             .ASCII  /OR:/
1317 006637  040  045  117             .ASCII  / %O/
1318 006642  066  045  116             .ASCII  /6%N/
1319 006645  045  116  000             .ASCII  /%N/<00>
1320 006650  045  101  107  P.AAU:     .ASCII  /%AG/
1321 006653  117  117  104             .ASCII  /OOD/
1322 006656  040  116  111             .ASCII  / NI/
1323 006661  102  040  104             .ASCII  /B D/
1324 006664  101  124  101             .ASCII  /ATA/
1325 006667  072  040  045             .ASCII  /: %/
1326 006672  117  062  045             .ASCII  /O2%/
1327 006675  101  040  040             .ASCII  /A  /
1328 006700  040  040  102             .ASCII  /  B/
1329 006703  101  104  040             .ASCII  /AD /
1330 006706  116  111  102             .ASCII  /NIB/
1331 006711  040  104  101             .ASCII  / DA/
1332 006714  124  101  072             .ASCII  /TA:/
1333 006717  040  045  117             .ASCII  / %O/
1334 006722  062  045  101             .ASCII  /2%A/
1335 006725  040  040  040             .ASCII  /   /
1336 006730  040  116  111             .ASCII  / NI/
1337 006733  102  040  120             .ASCII  /B P/
1338 006736  117  123  072             .ASCII  /OS:/
1339 006741  040  045  117             .ASCII  / %O/
1340 006744  064  045  116             .ASCII  /4%N/
1341 006747  045  116  000             .ASCII  /%N/<00>
1342 006752  045  101  116  P.AAV:     .ASCII  /%AN/
1343 006755  [illegible]  102  040     .ASCII  /IB /
1344 006760  [illegible]  116  040     .ASCII  /IN /
1345 006763  105  122  122             .ASCII  /ERR/
1346 006766  117  122  072             .ASCII  /OR:/
1347 006771  040  045  104             .ASCII  / %D/
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<

006774    064    045    116                .ASCII  /4%N/
006777    045    116    000                .ASCII  /%N/<00>
007002    045    101    106  P.AAW:        .ASCII  /%AF/
007005    101    111    114                .ASCII  /AIL/
007010    105    104    040                .ASCII  /ED /
007013    101    124    072                .ASCII  /AT:/
007016    040    045    117                .ASCII  / %O/
007021    066    045    116                .ASCII  /6%N/
007024    045    116    000                .ASCII  /%N/<00>
007027    000                               .ASCII  <00>
007030    045    101    122  P.AAX:        .ASCII  /%AR/
007033    105    120    114                .ASCII  /EPL/
007036    101    103    105                .ASCII  /ACE/
007041    040    101    122                .ASCII  / AR/
007044    122    040    115                .ASCII  /R M/
007047    117    104    072                .ASCII  /OD:/
007052    040    045    104                .ASCII  / %D/
007055    062    045    116                .ASCII  /2%N/
007060    045    116    000                .ASCII  /%N/<00>
007063    000                               .ASCII  <00>
007064    045    101    106  P.AAY:        .ASCII  /%AF/
007067    101    111    114                .ASCII  /AIL/
007072    105    104    040                .ASCII  /ED /
007075    101    124    040                .ASCII  /AT /
007100    104    123    101                .ASCII  /DSA/
007103    072    040    045                .ASCII  /: %/
007106    117    066    045                .ASCII  /O6%/
007111    116    045    116                .ASCII  /N%N/
007114    000    000                       .ASCII  <00><00>
007116    045    101    102  P.AAZ:        .ASCII  /%AB/
007121    111    124    074                .ASCII  /IT</
007124    061    065    072                .ASCII  /15:/
007127    061    060    076                .ASCII  /10>/
007132    072    040    045                .ASCII  /: %/
007135    102    066    045                .ASCII  /B6%/
007140    101    040    040                .ASCII  /A  /
007143    040    040    102                .ASCII  /  B/
007146    111    124    074                .ASCII  /IT</
007151    071    072    060                .ASCII  /9:0/
007154    076    072    040                .ASCII  />: /
007157    045    102    061                .ASCII  /%B1/
007162    060    045    116                .ASCII  /0%N/
007165    045    116    000                .ASCII  /%N/<00>
007170    045    101    106  P.ABA:        .ASCII  /%AF/
007173    101    111    114                .ASCII  /AIL/
007176    111    116    107                .ASCII  /ING/
007201    040    122    105                .ASCII  / RE/
007204    107    040    101                .ASCII  /G A/
007207    104    122    123                .ASCII  /DRS/
007212    072    040    045                .ASCII  /: %/
007215    117    066    045                .ASCII  /O6%/
007220    116    045    116                .ASCII  /N%N/
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1405                                    ;ML4AD
1406                                    ;               ROUTINE DECLARATION SECTION
1407
1408 007223  000                                P.ABB:  .ASCII  <00>
1409 007224  045  101  106                             .ASCII  /%AF/
1410 007227  101  111  114                             .ASCII  /AIL/
1411 007232  111  116  107                             .ASCII  /ING/
1412 007235  040  106  125                             .ASCII  / FU/
1413 007240  116  103  072                             .ASCII  /NC:/
1414 007243  040  045  117                             .ASCII  / %O/
1415 007246  066  045  116                             .ASCII  /6%N/
1416 007251  045  116  000                             .ASCII  /%N/<00>
1417 007254  040  045  101                P.ABC:       .ASCII  / %A/
1418 007257  117  106  106                             .ASCII  /OFF/
1419 007262  137  123  105                             .ASCII  / SE/
1420 007265  124  040  103                             .ASCII  /T C/
1421 007270  116  124  040                             .ASCII  /NT /
1422 007273  106  117  122                             .ASCII  /FOR/
1423 007276  040  116  111                             .ASCII  / NI/
1424 007301  102  040  072                             .ASCII  /B :/
1425 007304  040  045  104                             .ASCII  / %D/
1426 007307  062  040  045                             .ASCII  /2 %/
1427 007312  101  040  075                             .ASCII  /A =/
1428 007315  040  045  104                             .ASCII  / %D/
1429 007320  062  040  045                             .ASCII  /2 %/
1430 007323  116  045  116                             .ASCII  /N%N/
1431 007326  000  000                                  .ASCII  <00><00>
1432 007330  045  101  127                P.ABD:       .ASCII  /%AW/
1433 007333  122  117  124                             .ASCII  /ROT/
1434 007336  105  072  040                             .ASCII  /E: /
1435 007341  045  104  062                             .ASCII  /%D2/
1436 007344  045  101  040                             .ASCII  /%A /
1437 007347  040  040  040                             .ASCII  /   /
1438 007352  122  105  101                             .ASCII  /REA/
1439 007355  104  072  040                             .ASCII  /D: /
1440 007360  045  104  062                             .ASCII  /%D2/
1441 007363  045  116  045                             .ASCII  /%N%/
1442 007366  116  000                                  .ASCII  /N/<00>
1443 007370  045  101  116                P.ABE:       .ASCII  /%AN/
1444 007373  111  102  102                             .ASCII  /IBB/
1445 007376  114  105  123                             .ASCII  /LES/
1446 007401  040  130  106                             .ASCII  / XF/
1447 007404  105  122  105                             .ASCII  /ERE/
1448 007407  104  040  102                             .ASCII  /D B/
1449 007412  105  106  117                             .ASCII  /EFO/
1450 007415  122  105  040                             .ASCII  /RE /
1451 007420  105  122  122                             .ASCII  /ERR/
1452 007423  117  122  072                             .ASCII  /OR:/
1453 007426  040  045  104                             .ASCII  / %D/
1454 007431  063  045  116                             .ASCII  /3%N/
1455 007434  000  000                                  .ASCII  <00><00>
1456 007436  045  101  106                P.ABF:       .ASCII  /%AF/
1457 007441  101  111  114                             .ASCII  /AIL/
1458 007444  111  116  107                             .ASCII  /ING/
1459 007447  040  122  105                             .ASCII  / RE/
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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<

007452    107    072    040                .ASCII  /G: /
007455    045    117    066                .ASCII  /%06/
007460    045    101    040                .ASCII  /%A /
007463    107    117    117                .ASCII  /GOO/
007466    104    040    104                .ASCII  /D D/
007471    101    124    101                .ASCII  /ATA/
007474    072    040    045                .ASCII  /: %/
007477    117    066    045                .ASCII  /06%/
007502    101    040    102                .ASCII  /A B/
007505    101    104    040                .ASCII  /AD /
007510    104    101    124                .ASCII  /DAT/
007513    101    072    040                .ASCII  /A: /
007516    045    117    066                .ASCII  /%06/
007521    045    116    045                .ASCII  /%N%/
007524    116    000                       .ASCII  /N/<00>
007526    045    116    045    P.ABG:      .ASCII  /%N%/
007531    101    104    111                .ASCII  /ADI/
007534    101    107    116                .ASCII  /AGN/
007537    117    123    111                .ASCII  /OSI/
007542    116    107    040                .ASCII  /NG /
007545    125    116    111                .ASCII  /UNI/
007550    124    040    045                .ASCII  /T %/
007553    117    061    045                .ASCII  /01%/
007556    116    045    116                .ASCII  /N%N/
007561    000                               .ASCII  <00>
007562    045    101    124    P.ABH:      .ASCII  /%AT/
007565    111    115    105                .ASCII  /IME/
007570    104    040    117                .ASCII  /D O/
007573    125    124    040                .ASCII  /UT /
007576    104    125    122                .ASCII  /DUR/
007601    111    116    107                .ASCII  /ING/
007604    040    115    102                .ASCII  / MB/
007607    125    123    040                .ASCII  /US /
007612    045    117    062                .ASCII  /%02/
007615    045    101    040                .ASCII  /%A /
007620    106    125    116                .ASCII  /FUN/
007623    103    045    116                .ASCII  /C%N/
007626    045    116    000                .ASCII  /%N/<00>
007631    000                               .ASCII  <00>
007632    045    101    103    P.ABI:      .ASCII  /%AC/
007635    122    103    040                .ASCII  /RC /
007640    107    105    116                .ASCII  /GEN/
007643    040    075    040                .ASCII  / = /
007646    102    072    040                .ASCII  /B: /
007651    045    102    066                .ASCII  /%B6/
007654    045    101    040                .ASCII  /%A /
007657    101    072    040                .ASCII  /A: /
007662    045    102    066                .ASCII  /%B6/
007665    045    101    040                .ASCII  /%A /
007670    120    072    040                .ASCII  /P: /
007673    045    102    066                .ASCII  /%B6/
007676    045    116    000                .ASCII  /%N/<00>
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                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<

007701    000                                   .ASCII  <00>
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007705    122     103     040                   .ASCII  /RC /
007710    103     101     114                   .ASCII  /CAL/
007713    040     075     040                   .ASCII  / = /
007716    102     072     040                   .ASCII  /B: /
007721    045     102     066                   .ASCII  /%B6/
007724    045     101     040                   .ASCII  /%A /
007727    101     072     040                   .ASCII  /A: /
007732    045     102     066                   .ASCII  /%B6/
007735    045     101     040                   .ASCII  /%A /
007740    120     072     040                   .ASCII  /P: /
007743    045     102     066                   .ASCII  /%B6/
007746    045     116     045                   .ASCII  /%N%/
007751    116     000     000                   .ASCII  /N/<00><00>
007754    045     101     106   P.ABK:          .ASCII  /%AF/
007757    101     111     114                   .ASCII  /AIL/
007762    105     104     040                   .ASCII  /ED /
007765    101     124     040                   .ASCII  /AT /
007770    120     114     117                   .ASCII  /PLO/
007773    107     072     040                   .ASCII  /G: /
007776    045     104     062                   .ASCII  /%D2/
010001    045     101     040                   .ASCII  /%A /
010004    103     110     101                   .ASCII  /CHA/
010007    116     116     105                   .ASCII  /NNE/
010012    114     072     040                   .ASCII  /L: /
010015    045     104     062                   .ASCII  /%D2/
010020    045     116     045                   .ASCII  /%N%/
010023    116     000     000                   .ASCII  /N/<00><00>
010026    045     101     106   P.ABL:          .ASCII  /%AF/
010031    101     111     114                   .ASCII  /AIL/
010034    105     104     040                   .ASCII  /ED /
010037    101     124     040                   .ASCII  /AT /
010042    127     122     104                   .ASCII  /WRD/
010045    072     040     045                   .ASCII  /: %/
010050    104     062     045                   .ASCII  /D2%/
010053    101     040     102                   .ASCII  /A B/
010056    111     124     072                   .ASCII  /IT:/
010061    040     045     104                   .ASCII  / %D/
010064    062     045     116                   .ASCII  /2%N/
010067    045     116     000                   .ASCII  /%N/<00>
010072    045     101     122   P.ABM:          .ASCII  /%AR/
010075    105     107     111                   .ASCII  /EGI/
010100    123     124     105                   .ASCII  /STE/
010103    122     045     123                   .ASCII  /R%S/
010106    063     045     101                   .ASCII  /3%A/
010111    101     104     104                   .ASCII  /ADD/
010114    122     105     123                   .ASCII  /RES/
010117    123     045     123                   .ASCII  /S%S/
010122    067     045     101                   .ASCII  /7%A/
010125    103     117     116                   .ASCII  /CON/
010130    124     105     116                   .ASCII  /TEN/
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1573                                    ;ML4AD                          29-Mar-1982 16:23:04    TOPS
1574                                    ;       ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
1575
1576 010133  124  123  045              .ASCII  /TS%/
1577 010136  116  045  116              .ASCII  /N%N/
1578 010141  000                        .ASCII  <00>
1579 010142  045  123  045  P.ABN:      .ASCII  /%S%/
1580 010145  124  045  123              .ASCII  /T%S/
1581 010150  065  045  117              .ASCII  /5%O/
1582 010153  066  045  123              .ASCII  /6%S/
1583 010156  064  045  117              .ASCII  /4%O/
1584 010161  061  066  045              .ASCII  /16%/
1585 010164  116  000                   .ASCII  /N/<00>
1586 010166  045  123  064  P.ABO:      .ASCII  /%S4/
1587 010171  045  124  045              .ASCII  /%T%/
1588 010174  101  072  045              .ASCII  /A:%/
1589 010177  123  045  117              .ASCII  /S%O/
1590 010202  066  045  116              .ASCII  /6%N/
1591 010205  000                        .ASCII  <00>
1592 010206  045  123  064  P.ABP:      .ASCII  /%S4/
1593 010211  045  124  045              .ASCII  /%T%/
1594 010214  101  072  045              .ASCII  /A:%/
1595 010217  123  045  104              .ASCII  /S%D/
1596 010222  061  045  104              .ASCII  /1%D/
1597 010225  061  045  104              .ASCII  /1%D/
1598 010230  061  045  104              .ASCII  /1%D/
1599 010233  061  045  116              .ASCII  /1%N/
1600 010236  000  000                   .ASCII  <00><00>
1601 010240  045  124  045  P.ABQ:      .ASCII  /%T%/
1602 010243  116  000  000              .ASCII  /N/<00><00>
1603 010246  045  124  045  P.ABR:      .ASCII  /%T%/
1604 010251  124  045  116              .ASCII  /T%N/
1605 010254  000  000                   .ASCII  <00><00>
1606 010256  045  124  045  P.ABS:      .ASCII  /%T%/
1607 010261  124  045  124              .ASCII  /T%T/
1608 010264  045  116  000              .ASCII  /%N/<00>
1609 010267  000                        .ASCII  <00>
1610 010270  045  124  045  P.ABT:      .ASCII  /%T%/
1611 010273  124  045  124              .ASCII  /T%T/
1612 010276  045  124  045              .ASCII  /%T%/
1613 010301  116  000  000              .ASCII  /N/<00><00>
1614 010304  045  124  045  P.ABU:      .ASCII  /%T%/
1615 010307  124  045  124              .ASCII  /T%T/
1616 010312  045  124  045              .ASCII  /%T%/
1617 010315  124  045  116              .ASCII  /T%N/
1618 010320  000  000                   .ASCII  <00><00>
1619 010322  045  124  045  P.ABV:      .ASCII  /%T%/
1620 010325  124  045  124              .ASCII  /T%T/
1621 010330  045  124  045              .ASCII  /%T%/
1622 010333  124  045  124              .ASCII  /T%T/
1623 010336  045  116  000              .ASCII  /%N/<00>
1624 010341  000                        .ASCII  <00>
1625 010342  045  124  045  P.ABW:      .ASCII  /%T%/
1626 010345  124  045  124              .ASCII  /T%T/
1627 010350  045  124  045              .ASCII  /%T%/
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                                                                                29-Mar-1982 16:23:04    TOPS
                                                                                29-Mar-1982 16:21:03    PA:<
1629                                    ;ML4AD
1630                                    ;               ROUTINE DECLARATION SECTION
1631
1632 010353    124     045     124             .ASCII  /T%T/
1633 010356    045     124     045             .ASCII  /%T%/
1634 010361    116     000     000             .ASCII  /N/<00><00>
1635 010364    045     124     045     P.ABX:  .ASCII  /%T%/
1636 010367    124     045     124             .ASCII  /T%T/
1637 010372    045     124     045             .ASCII  /%T%/
1638 010375    124     045     124             .ASCII  /T%T/
1639 010400    045     124     045             .ASCII  /%T%/
1640 010403    124     045     116             .ASCII  /T%N/
1641 010406    000     000                     .ASCII  <00><00>
1642 010410    045     124     045     P.ABY:  .ASCII  /%T%/
1643 010413    124     045     124             .ASCII  /T%T/
1644 010416    045     124     045             .ASCII  /%T%/
1645 010421    124     045     124             .ASCII  /T%T/
1646 010424    045     124     045             .ASCII  /%T%/
1647 010427    124     045     124             .ASCII  /T%T/
1648 010432    045     116     000             .ASCII  /%N/<00>
1649 010435    000                             .ASCII  <00>
1650 010436    045     124     045     P.ABZ:  .ASCII  /%T%/
1651 010441    124     045     124             .ASCII  /T%T/
1652 010444    045     124     045             .ASCII  /%T%/
1653 010447    124     045     124             .ASCII  /T%T/
1654 010452    045     124     045             .ASCII  /%T%/
1655 010455    124     045     124             .ASCII  /T%T/
1656 010460    045     124     045             .ASCII  /%T%/
1657 010463    116     000     000             .ASCII  /N/<00><00>
1658 010466    045     124     045     P.ACA:  .ASCII  /%T%/
1659 010471    124     045     124             .ASCII  /T%T/
1660 010474    045     124     045             .ASCII  /%T%/
1661 010477    124     045     124             .ASCII  /T%T/
1662 010502    045     124     045             .ASCII  /%T%/
1663 010505    124     045     124             .ASCII  /T%T/
1664 010510    045     124     045             .ASCII  /%T%/
1665 010513    124     045     116             .ASCII  /T%N/
1666 010516    000     000                     .ASCII  <00><00>
1667 010520    040     107     117     P.ACB:  .ASCII  / GO/
1668 010523    000                             .ASCII  <00>
1669 010524    040     104     122     P.ACC:  .ASCII  / DR/
1670 010527    126     137     122             .ASCII  /V_R/
1671 010532    104     131     000             .ASCII  /DY/<00>
1672 010535    000                             .ASCII  <00>
1673 010536    040     111     114     P.ACD:  .ASCII  / IL/
1674 010541    106     000     000             .ASCII  /F/<00><00>
1675 010544    040     117     120     P.ACE:  .ASCII  / OP/
1676 010547    111     000     000             .ASCII  /I/<00><00>
1677 010552    040     102     101     P.ACF:  .ASCII  / BA/
1678 010555    104     000     000             .ASCII  /D/<00><00>
1679 010560    040     107     117     P.ACG:  .ASCII  / GO/
1680 010563    117     104     000             .ASCII  /OD/<00>
1681 010566    040     120     101     P.ACH:  .ASCII  / PA/
1682 010571    122     111     124             .ASCII  /RIT/
1683 010574    131     040     116             .ASCII  /Y N/
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                                        ;ML4AD                                                  29-Mar-1982 16:23.04    TOP
                                        ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA
010577    117    124    000                .ASCII  /OT/<00>
010602    040    107    105   P.ACI:       .ASCII  / GE/
010605    116    105    122                .ASCII  /NER/
010610    101    124    105                .ASCII  /ATE/
010613    104    000    000                .ASCII  /D/<00><00>
010616    040    104    105   P.ACJ:       .ASCII  / DE/
010621    124    105    103                .ASCII  /TEC/
010624    124    105    104                .ASCII  /TED/
010627    000                               .ASCII  <00>
010630    040    105    122   P.ACK:       .ASCII  / ER/
010633    122    117    122                .ASCII  /ROR/
010636    000    000                       .ASCII  <00><00>
010640    040    101    106   P.ACL:       .ASCII  / AF/
010643    124    105    122                .ASCII  /TER/
010646    000    000                       .ASCII  <00><00>
010650    040    104    125   P.ACM:       .ASCII  / DU/
010653    122    111    116                .ASCII  /RIN/
010656    107    000                       .ASCII  /G/<00>
010660    040    101    124   P.ACN:       .ASCII  / AT/
010663    000                               .ASCII  <00>
010664    040    106    101   P.ACO:       .ASCII  / FA/
010667    111    114    125                .ASCII  /ILU/
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010675    000                               .ASCII  <00>
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010701    101    000    000                .ASCII  /A/<00><00>
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010707    124    116    000                .ASCII  /TN/<00>
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010715    111    124    111                .ASCII  /ITI/
010720    116    107    000                .ASCII  /NG/<00>
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010727    000                               .ASCII  <00>
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010741    105    000    000                .ASCII  /E/<00><00>
010744    040    122    115   P.ACV:       .ASCII  / RM/
010747    122    000    000                .ASCII  /R/<00><00>
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010755    103    105    123                .ASCII  /CES/
010760    123    111    126                .ASCII  /SIV/
010763    105    000    000                .ASCII  /E/<00><00>
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010771    125    123    000                .ASCII  /US/<00>
010774    040    104    101   P.ACY:       .ASCII  / DA/
010777    124    101    000                .ASCII  /TA/<00>
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1745 011021  105  000  000           .ASCII  /E/<00><00>
1746 011024  040  114  102  P.ADB:  .ASCII  / LB/
1747 011027  124  000  000           .ASCII  /T/<00><00>
1748 011032  040  120  122  P.ADC:  .ASCII  / PR/
1749 011035  105  115  101           .ASCII  /EMA/
1750 011040  124  125  122           .ASCII  /TUR/
1751 011043  114  131  000           .ASCII  /LY/<00>
1752 011046  040  111  101  P.ADD:  .ASCII  / IA/
1753 011051  105  000  000           .ASCII  /E/<00><00>
1754 011054  040  111  116  P.ADE:  .ASCII  / IN/
1755 011057  103  122  105           .ASCII  /CRE/
1756 011062  115  105  116           .ASCII  /MEN/
1757 011065  124  000  000           .ASCII  /T/<00><00>
1758 011070  040  127  111  P.ADF:  .ASCII  / WI/
1759 011073  124  110  000           .ASCII  /TH/<00>
1760 011076  040  125  126  P.ADG:  .ASCII  / UV/
1761 011101  000                    .ASCII  <00>
1762 011102  040  125  116  P.ADH:  .ASCII  / UN/
1763 011105  123  000  000           .ASCII  /S/<00><00>
1764 011110  040  120  122  P.ADI:  .ASCII  / PR/
1765 011113  117  115  000           .ASCII  /OM/<00>
1766 011116  040  117  122  P.ADJ:  .ASCII  / OR/
1767 011121  000                    .ASCII  <00>
1768 011122  040  123  105  P.ADK:  .ASCII  / SE/
1769 011125  114  105  103           .ASCII  /LEC/
1770 011130  124  000                .ASCII  /T/<00>
1771 011132  040  122  105  P.ADL:  .ASCII  / RE/
1772 011135  107  000  000           .ASCII  /G/<00><00>
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1774 011143  111  121  125           .ASCII  /IQU/
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1777 011153  000                    .ASCII  <00>
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1779 011157  102  102  114           .ASCII  /BBL/
1780 011162  105  040  103           .ASCII  /E C/
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1783 011173  122  000  000           .ASCII  /R/<00><00>
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1785 011201  111  114  105           .ASCII  /ILE/
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1787 011206  040  124  122  P.ADR:  .ASCII  / TR/
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1790 011217  111  124  111           .ASCII  /ITI/
1791 011222  101  114  000           .ASCII  /AL/<00>
1792 011225  000                    .ASCII  <00>
1793 011226  040  117  106  P.ADT:  .ASCII  / OF/
1794 011231  106  137  123           .ASCII  /F_S/
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011253    114     101     131                   .ASCII  /LAY/
011256    000     000                           .ASCII  <00><00>
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011304    105     122     000                   .ASCII  /ER/<00>
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011321    123     124     105                   .ASCII  /STE/
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011326    040     116     111   P.AEB:          .ASCII  / NI/
011331    102     102     114                   .ASCII  /BBL/
011334    105     000                           .ASCII  /E/<00>
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011341    114     000     000                   .ASCII  /L/<00><00>
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011347    123     124     000                   .ASCII  /ST/<00>
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011355    105     122     105                   .ASCII  /ERE/
011360    104     000                           .ASCII  /D/<00>
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011370    105     123     000                   .ASCII  /ES/<00>
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011377    000                                   .ASCII  <00>
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011403    114     124     111                   .ASCII  /LTI/
011406    120     114     105                   .ASCII  /PLE/
011411    130     105     122                   .ASCII  /XER/
011414    000     000                           .ASCII  <00><00>
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011421    105     130     120                   .ASCII  /EXP/
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011427    105     104     000                   .ASCII  /ED/<00>
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011451    103     000     000                   .ASCII  /C/<00><00>
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1857 011457    114     000     000             .ASCII  /L/<00><00>
1858 011462    040     105     103     P.AEN:  .ASCII  / EC/
1859 011465    110     000     000             .ASCII  /H/<00><00>
1860 011470    125     116     103     P.AEO:  .ASCII  /UNC/
1861 011473    000                             .ASCII  <00>
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1863 011477    124     000     000             .ASCII  /T/<00><00>
1864 011502    040     103     110     P.AEQ:  .ASCII  / CH/
1865 011505    101     116     116             .ASCII  /ANN/
1866 011510    105     114     000             .ASCII  /EL/<00>
1867 011513    000                             .ASCII  <00>
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1869 011517    124     103     110             .ASCII  /TCH/
1870 011522    000     000                     .ASCII  <00><00>
1871 011524    040     104     103     P.AES:  .ASCII  / DC/
1872 011527    113     000     000             .ASCII  /K/<00><00>
1873 011532    040     102     125     P.AET:  .ASCII  / BU/
1874 011535    123     000     000             .ASCII  /S/<00><00>
1875 011540    040     123     131     P.AEU:  .ASCII  / SY/
1876 011543    116     104     122             .ASCII  /NDR/
1877 011546    117     116     105             .ASCII  /ONE/
1878 011551    000                             .ASCII  <00>
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1883 011565    124     000     000             .ASCII  /T/<00><00>
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1886 011576    122     105     103             .ASCII  /REC/
1887 011601    124     101     102             .ASCII  /TAB/
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1892 011616    117     124     040             .ASCII  /OT /
1893 011621    123     105     124             .ASCII  /SET/
1894 011624    000     000                     .ASCII  <00><00>
1895 011626    040     102     111     P.AEZ:  .ASCII  / BI/
1896 011631    124     040     116             .ASCII  /T N/
1897 011634    117     124     040             .ASCII  /OT /
1898 011637    103     114     122             .ASCII  /CLR/
1899 011642    000     000                     .ASCII  <00><00>
1900 011644    040     116     117     P.AFA:  .ASCII  / NO/
1901 011647    040     122     105             .ASCII  / RE/
1902 011652    123     120     117             .ASCII  /SPO/
1903 011655    116     103     105             .ASCII  /NCE/
1904 011660    040     101     106             .ASCII  / AF/
1905 011663    124     105     122             .ASCII  /TER/
1906 011666    040     061     056             .ASCII  / 1./
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011707    117    122    123                  .ASCII  /ORS/
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011717    124    040    123                  .ASCII  /T S/
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011746    110    105    122                  .ASCII  /HER/
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012041    116    107    114                  .ASCII  /NGL/
012044    105    040    102                  .ASCII  /E B/
012047    111    124    040                  .ASCII  /IT /
012052    105    122    122                  .ASCII  /ERR/
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012063    114    124    111                  .ASCII  /LTI/
012066    120    114    105                  .ASCII  /PLE/
012071    040    102    111                  .ASCII  / BI/
012074    124    040    105                  .ASCII  /T E/
012077    122    122    117                  .ASCII  /RRO/
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                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<

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012203    111    124    105            .ASCII  /ITE/
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012231    101    104    000            .ASCII  /AD/<00>
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012313    120    122    105            .ASCII  /PRE/
012316    123    105    124            .ASCII  /SET/
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29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

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2029 012347  122  040  122                             .ASCII  /R R/
2030 012352  104  137  127                             .ASCII  /D_W/
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2061 012472  101  114  111                             .ASCII  /ALI/
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2064 012503  103  123  061                             .ASCII  /CS1/
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2066 012510  040  115  114  P.AGK:                     .ASCII  / ML/
2067 012513  104  123  000                             .ASCII  /DS/<00>
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2071 012527  115  122  000                             .ASCII  /MR/<00>
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2073 012535  101  123  000                             .ASCII  /AS/<00>
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2075 012543  104  101  000                             .ASCII  /DA/<00>
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2081 012551  104  124  000           .ASCII  /DT/<00>
2082 012554  040  115  114  P.AGQ:  .ASCII  / ML/
2083 012557  120  101  000           .ASCII  /PA/<00>
2084 012562  040  115  114  P.AGR:  .ASCII  / ML/
2085 012565  123  116  000           .ASCII  /SN/<00>
2086 012570  040  115  114  P.AGS:  .ASCII  / ML/
2087 012573  105  061  000           .ASCII  /E1/<00>
2088 012576  040  115  114  P.AGT:  .ASCII  / ML/
2089 012601  105  062  000           .ASCII  /E2/<00>
2090 012604  040  115  114  P.AGU:  .ASCII  / ML/
2091 012607  104  061  000           .ASCII  /D1/<00>
2092 012612  040  115  114  P.AGV:  .ASCII  / ML/
2093 012615  104  062  000           .ASCII  /D2/<00>
2094 012620  040  115  114  P.AGW:  .ASCII  / ML/
2095 012623  105  105  000           .ASCII  /EE/<00>
2096 012626  040  115  114  P.AGX:  .ASCII  / ML/
2097 012631  105  114  000           .ASCII  /EL/<00>
2098 012634  040  115  114  P.AGY:  .ASCII  / ML/
2099 012637  120  104  000           .ASCII  /PD/<00>
2100 012642  040  115  114  P.AGZ:  .ASCII  / ML/
2101 012645  103  123  062           .ASCII  /CS2/
2102 012650  000  000                .ASCII  <00><00>
2103 012652  040  115  114  P.AHA:  .ASCII  / ML/
2104 012655  127  103  000           .ASCII  /WC/<00>
2105 012660  040  115  114  P.AHB:  .ASCII  / ML/
2106 012663  102  101  000           .ASCII  /BA/<00>
2107 012666  040  115  114  P.AHC:  .ASCII  / ML/
2108 012671  102  101  111           .ASCII  /BAI/
2109 012674  000  000                .ASCII  <00><00>
2110 012676  040  115  114  P.AHD:  .ASCII  / ML/
2111 012701  103  123  063           .ASCII  /CS3/
2112 012704  000  000                .ASCII  <00><00>
2113 012706  101  123  131  P.AHE:  .ASCII  /ASY/
2114 012711  116  103  110           .ASCII  /NCH/
2115 012714  122  117  116           .ASCII  /RON/
2116 012717  117  125  123           .ASCII  /OUS/
2117 012722  040  106  101           .ASCII  / FA/
2118 012725  111  114  125           .ASCII  /ILU/
2119 012730  122  105  040           .ASCII  /RE /
2120 012733  115  117  104           .ASCII  /MOD/
2121 012736  125  114  105           .ASCII  /ULE/
2122 012741  040  067  063           .ASCII  / 73/
2123 012744  066  061  000           .ASCII  /61/<00>
2124 012747  000                     .ASCII  <00>
2125 012750  123  131  116  P.AHF:  .ASCII  /SYN/
2126 012753  103  110  122           .ASCII  /CHR/
2127 012756  117  116  117           .ASCII  /ONO/
2128 012761  125  123  040           .ASCII  /US /
2129 012764  106  101  111           .ASCII  /FAI/
2130 012767  114  125  122           .ASCII  /LUR/
2131 012772  105  040  115           .ASCII  /E M/
```

```
2133                                    ;ML4AD
2134                                    ;               ROUTINE DECLARATION SECTION
2135
2136 012775    117     104     125             .ASCII  /ODU/
2137 013000    114     105     040             .ASCII  /LE /
2138 013003    067     063     066             .ASCII  /736/
2139 013006    062     040     000             .ASCII  /2 /<00>
2140 013011    000                             .ASCII  <00>
2141 013012    101     122     122     P.AHG:  .ASCII  /ARR/
2142 013015    101     131     040             .ASCII  /AY /
2143 013020    104     101     124             .ASCII  /DAT/
2144 013023    101     040     106             .ASCII  /A F/
2145 013026    101     111     114             .ASCII  /AIL/
2146 013031    125     122     105             .ASCII  /URE/
2147 013034    040     115     117             .ASCII  / MO/
2148 013037    104     125     114             .ASCII  /DUL/
2149 013042    105     040     067             .ASCII  /E 7/
2150 013045    063     066     063             .ASCII  /363/
2151 013050    040     000                     .ASCII  / /<00>
2152 013052    115     105     115     P.AHH:  .ASCII  /MEM/
2153 013055    117     122     131             .ASCII  /ORY/
2154 013060    040     101     122             .ASCII  / AR/
2155 013063    122     101     131             .ASCII  /RAY/
2156 013066    040     106     101             .ASCII  / FA/
2157 013071    111     114     125             .ASCII  /ILU/
2158 013074    122     105     040             .ASCII  /RE /
2159 013077    115     117     104             .ASCII  /MOD/
2160 013102    125     114     105             .ASCII  /ULE/
2161 013105    040     067     063             .ASCII  / 73/
2162 013110    065     067     000             .ASCII  /57/<00>
2163 013113    000                             .ASCII  <00>
2164 013114    111     116     124     P.AHI:  .ASCII  /INT/
2165 013117    105     122     115             .ASCII  /ERM/
2166 013122    105     104     111             .ASCII  /EDI/
2167 013125    101     124     105             .ASCII  /ATE/
2168 013130    040     104     111             .ASCII  / DI/
2169 013133    101     107     116             .ASCII  /AGN/
2170 013136    117     123     124             .ASCII  /OST/
2171 013141    111     103     040             .ASCII  /IC /
2172 013144    115     105     123             .ASCII  /MES/
2173 013147    123     101     107             .ASCII  /SAG/
2174 013152    105     000                     .ASCII  /E/<00>
2175 013154    104     101     124     P.AHJ:  .ASCII  /DAT/
2176 013157    101     040     114             .ASCII  /A L/
2177 013162    101     124     105             .ASCII  /ATE/
2178 013165    040     105     122             .ASCII  / ER/
2179 013170    122     117     122             .ASCII  /ROR/
2180 013173    040     104     125             .ASCII  / DU/
2181 013176    122     111     116             .ASCII  /RIN/
2182 013201    107     040     124             .ASCII  /G T/
2183 013204    122     101     116             .ASCII  /RAN/
2184 013207    123     106     105             .ASCII  /SFE/
2185 013212    122     000                     .ASCII  /R/<00>
2186 013214    123     103     040     P.AHK:  .ASCII  /SC /
2187 013217    102     111     124             .ASCII  /BIT/
```

```
2189                                    ;ML4AD
2190                                    :               ROUTINE DECLARATION SECTION
2191
2192 013222    040     123     105             .ASCII  / SE/
2193 013225    124     040     104             .ASCII  /T D/
2194 013230    125     122     111             .ASCII  /URI/
2195 013233    116     107     040             .ASCII  /NG /
2196 013236    124     122     101             .ASCII  /TRA/
2197 013241    116     123     106             .ASCII  /NSF/
2198 013244    105     122     000             .ASCII  /ER/<00>
2199 013247    000                             .ASCII  <00>
2200 013250    124     122     117     P.AHL:  .ASCII  /TRO/
2201 013253    125     102     114             .ASCII  /UBL/
2202 013256    105     040     123             .ASCII  /E S/
2203 013261    110     117     117             .ASCII  /HOO/
2204 013264    124     040     114             .ASCII  /T L/
2205 013267    117     117     120             .ASCII  /OOP/
2206 013272    040     105     122             .ASCII  / ER/
2207 013275    122     117     122             .ASCII  /ROR/
2208 013300    123     000                     .ASCII  /S/<00>
2209 013302    122     110     040     P.AHM:  .ASCII  /RH /
2210 013305    103     117     116             .ASCII  /CON/
2211 013310    124     122     117             .ASCII  /TRO/
2212 013313    114     114     105             .ASCII  /LLE/
2213 013316    122     040     105             .ASCII  /R E/
2214 013321    122     122     117             .ASCII  /RRO/
2215 013324    122     123     000             .ASCII  /RS/<00>
2216 013327    000                             .ASCII  <00>
2217 013330    104     122     111     P.AHN:  .ASCII  /DRI/
2218 013333    126     105     040             .ASCII  /VE /
2219 013336    110     125     116             .ASCII  /HUN/
2220 013341    107     040     101             .ASCII  /G A/
2221 013344    106     124     105             .ASCII  /FTE/
2222 013347    122     040     115             .ASCII  /R M/
2223 013352    101     123     123             .ASCII  /ASS/
2224 013355    040     102     125             .ASCII  / BU/
2225 013360    123     040     124             .ASCII  /S T/
2226 013363    122     101     116             .ASCII  /RAN/
2227 013366    123     106     105             .ASCII  /SFE/
2228 013371    122     000     000             .ASCII  /R/<00><00>
2229
2230
2231
2232 013374                            NIB.SAVE:
2233 013374                                    .BLKW   3
2234 013402                            HW.OR.TBL:
2235 013402                                    .BLKW   177
2236 014000                            PTBL.PTR:
2237 014000                                    .BLKW   1
2238 014002                            OP.NUM.ARR:
2239 014002                                    .BLKW   1
2240 014004                            ARR.INC:.BLKW   1
2241 014006                            GOOD.BLK:
2242 014006                                    .BLKW   1
```

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                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<

014010                          PAR.DIS:.BLKW   1
014012                          CHIP.SIZ:
014012                                  .BLKW   1
014014                          LST.BLK:.BLKW   1
014016                          ARR.16: .BLKW   1
014020                          LST.ARR:.BLKW   1
014022                          IO.BUF: .BLKW   400
015022                          STK.OFF:.BLKW   5
015034                          STACK:  .BLKW   143
015342                          PD.TEMP:.BLKW   1
015344                          W.C.SIZE:
015344                                  .BLKW   1
015346                          RAS.INC:.BLKW   1
015350                          WT.DATA:.BLKW   1
015352                          RD.DATA:.BLKW   1
015354                          DRIVE.TYPE:
015354                                  .BLKW   1
015356                          LST.DUT.REG:
015356                                  .BLKW   1
015360                          REG.INIT.FLG:
015360  000000                          .WORD   0
015362                          A.CAL:  .BLKW   1
015364                          B.CAL:  .BLKW   1
015366                          P.CAL:  .BLKW   1
015370                          A.GEN:  .BLKW   1
015372                          B.GEN:  .BLKW   1
015374                          P.GEN:  .BLKW   1
015376                          P.CNT:  .BLKW   1
015400                          LIMIT:  .BLKW   1
015402                          DROP.CNT:
015402                                  .BLKW   1
015404     000                  ML.REG: .BYTE   0
015405     000                          .BYTE   0
015406  004000                          .WORD   4000
015410  173701                          .WORD   -4077
015412  160200                          .WORD   -17600
015414     000                          .BYTE   0
015415     000                          .BYTE   0
015416     000                          .BYTE   0
015417     000                          .BYTE   0
015420     000                          .BYTE   0
015421     000                          .BYTE   0
015422     000                          .BYTE   0
015423     000                          .BYTE   0
015424     000                          .BYTE   0
015425     000                          .BYTE   0
015426     000                          .BYTE   0
015427     000                          .BYTE   0
015430     000                          .BYTE   0
015431     000                          .BYTE   0
015432     000                          .BYTE   0
015433     000                          .BYTE   0
```

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                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03    PA:<

015434     000                                  .BYTE   0
015435     000                                  .BYTE   0
015436     000                                  .BYTE   0
015437     000                                  .BYTE   0
015440     000                                  .BYTE   0
015441     000                                  .BYTE   0
015442     000                                  .BYTE   0
015443     000                                  .BYTE   0
015444     000                                  .BYTE   0
015445     000                                  .BYTE   0
015446     000                                  .BYTE   0
015447     000                                  .BYTE   0
015450     000                                  .BYTE   0
015451     000                                  .BYTE   0
015452     000                                  .BYTE   0
015453     000                                  .BYTE   0
015454     000                                  .BYTE   0
015455     000                                  .BYTE   0
015456  010600                                  .WORD   10600
015460  025077                                  .WORD   25077
015462  000100                                  .WORD   100
015464     000                                  .BYTE   0
015465     000                                  .BYTE   0
015466     000                                  .BYTE   0
015467     000                                  .BYTE   0
015470  014620                                  .WORD   14620
015472     000                                  .BYTE   0
015473     000                                  .BYTE   0
015474     000                                  .BYTE   0
015475     000                                  .BYTE   0
015476     000                                  .BYTE   0
015477     000                                  .BYTE   0
015500     000                                  .BYTE   0
015501     000                                  .BYTE   0
015502  177400                                  .WORD   -400
015504     000                                  .BYTE   0
015505     000                                  .BYTE   0
015506     000                                  .BYTE   0
015507     000                                  .BYTE   0
015510  100000                                  .WORD   -100000
015512     000                                  .BYTE   0
015513     000                                  .BYTE   0
015514     000                                  .BYTE   0
015515     000                                  .BYTE   0
015516     000                                  .BYTE   0
015517     000                                  .BYTE   0
015520     000                                  .BYTE   0
015521     000                                  .BYTE   0
015522     000                                  .BYTE   0
015523     000                                  .BYTE   0
015524     000                                  .BYTE   0
015525     000                                  .BYTE   0
```

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                                ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<

015526     000                          .BYTE   0
015527     000                          .BYTE   0
015530  000020                          .WORD   20
015532  177400                          .WORD   -400
015534     000                          .BYTE   0
015535     000                          .BYTE   0
015536  000110                          .WORD   110
015540  177666                          .WORD   -112
015542  000001                          .WORD   1
015544     000                          .BYTE   0
015545     000                          .BYTE   0
015546     000                          .BYTE   0
015547     000                          .BYTE   0
015550     000                          .BYTE   0
015551     000                          .BYTE   0
015552     000                          .BYTE   0
015553     000                          .BYTE   0
015554     000                          .BYTE   0
015555     000                          .BYTE   0
015556     000                          .BYTE   0
015557     000                          .BYTE   0
015560  140300                          .WORD   -37500
015562     000                          .BYTE   0
015563     000                          .BYTE   0
015564     000                          .BYTE   0
015565     000                          .BYTE   0
015566     000                          .BYTE   0
015567     000                          .BYTE   0
015570  100300                          .WORD   -77500
015572     000                          .BYTE   0
015573     000                          .BYTE   0
015574     000                          .BYTE   0
015575     000                          .BYTE   0
015576     000                          .BYTF   0
015577     000                          .BYTE   0
015600     000                          .BYTE   0
015601     000                          .BYTE   0
015602     000                          .BYTE   0
015603     000                          .BYTE   0
015604     000                          .BYTE   0
015605     000                          .BYTE   0
015606     000                          .BYTE   0
015607     000                          .BYTE   0
015610     000                          .BYTE   0
015611     000                          .BYTE   0
015612     000                          .BYTE   0
015613     000                          .BYTE   0
015614     000                          .BYTE   0
015615     000                          .BYTE   0
015616     000                          .BYTE   0
015617     000                          .BYTE   0
015620  010000                          .WORD   10000
```

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                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03    PA:<

015622      000                                 .BYTE   0
015623      000                                 .BYTE   0
015624      000                                 .BYTE   0
015625      000                                 .BYTE   0
015626      000                                 .BYTE   0
015627      000                                 .BYTE   0
015630      000                                 .BYTE   0
015631      000                                 .BYTE   0
015632      000                                 .BYTE   0
015633      000                                 .BYTE   0
015634      000                                 .BYTE   0
015635      000                                 .BYTE   0
015636      000                                 .BYTE   0
015637      000                                 .BYTE   0
015640      000                                 .BYTE   0
015641      000                                 .BYTE   0
015642      000                                 .BYTE   0
015643      000                                 .BYTE   0
015644      000                                 .BYTE   0
015645      000                                 .BYTE   0
015646      000                                 .BYTE   0
015647      000                                 .BYTE   0
015650      000                                 .BYTE   0
015651      000                                 .BYTE   0
015652      000                                 .BYTE   0
015653      000                                 .BYTE   0
015654      000                                 .BYTE   0
015655      000                                 .BYTE   0
015656      000                                 .BYTE   0
015657      000                                 .BYTE   0
015660      000                                 .BYTE   0
015661      000                                 .BYTE   0
015662   000000                                 .WORD   0
015664   001001                         REM.TBL:.WORD   1001
015666   004004                                 .WORD   4004
015670   020020                                 .WORD   20020
015672   003003                                 .WORD   3003
015674   014014                                 .WORD   14014
015676   021460                                 .WORD   21460
015700   005005                                 .WORD   5005
015702   024024                                 .WORD   24024
015704   023023                                 .WORD   23023
015706   017017                                 .WORD   17017
015710   035474                                 .WORD   35474
015712   024465                                 .WORD   24465
015714   021021                                 .WORD   21021
015716   007007                                 .WORD   7007
015720   034034                                 .WORD   34034
015722   022463                                 .WORD   22463
015724   011011                                 .WORD   11011
015726   005444                                 .WORD   5444
015730   026026                                 .WORD   26026
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                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;                ROUTINE DECLARATION SECTION    29-Mar-1982 16:21:03    PA:<

015732  033033                                  .WORD   33033
015734  016457                                  .WORD   16457
015736  033472                                  .WORD   33472
015740  014455                                  .WORD   14455
015742  023462                                  .WORD   23462
015744  015015                                  .WORD   15015
015746  025464                                  .WORD   25464
015750  025025                                  .WORD   25025
015752  027027                                  .WORD   27027
015754  037037                                  .WORD   37037
015756  036477                                  .WORD   36477
015760  030471                                  .WORD   30471
015762     041                                  .BYTE   41
                                                .EVEN
015764  064477                          DT.1:   .WORD   64477
015766  007700                                  .WORD   7700
015770     000                                  .BYTE   0
015771     000                                  .BYTE   0
015772  064477                                  .WORD   64477
015774  000077                                  .WORD   77
015776     000                                  .BYTE   0
015777     000                                  .BYTE   0
016000  100577                                  .WORD   -77201
016002  017700                                  .WORD   17700
016004     077                                  .BYTE   77
016005     000                                  .BYTE   0
016006  100577                                  .WORD   -77201
016010  000000                                  .WORD   0
016012     077                                  .BYTE   77
016013     000                                  .BYTE   0
016014  100577                                  .WORD   -77201
016016  010077                                  .WORD   10077
016020     077                                  .BYTE   77
                                                .EVEN
016022                                  RH.ADD: .BLKW   1
016024                                  RH.TYP: .BLKW   1
016026                                  RH.VEC: .BLKW   1
016030                                  ML.LUN: .BLKW   1
016032                                  ML.DUT: .BLKW   1


                                                .GLOBL  REGDMP, ONEPAS, INTERVEN, PRSN
                                                .GLOBL  ERRTHR


        100000                          BIT15==         -100000
        040000                          BIT14==         40000
        020000                          BIT13==         20000
        010000                          BIT12==         10000
        004000                          BIT11==         4000
        002000                          BIT10==         2000
        001000                          BIT09==         1000
```

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                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03    PA:<
                                
000400                          BIT08==         400
000200                          BIT07==         200
000100                          BIT06==         100
000040                          BIT05==         40
000020                          BIT04==         20
000010                          BIT03==         10
000004                          BIT02==         4
000002                          BIT01==         2
000001                          BIT00==         1
001000                          BIT9==          1000
000400                          BIT8==          400
000200                          BIT7==          200
000100                          BIT6==          100
000040                          BIT5==          40
000020                          BIT4==          20
000010                          BIT3==          10
000004                          BIT2==          4
000002                          BIT1==          2
000001                          BIT0==          1
000040                          EF.START==      40
000037                          EF.RESTART==    37
000036                          EF.CONTINUE==   36
000035                          EF.NEW==        35
000034                          EF.PWR==        34
000340                          PRI07==         340
000300                          PRI06==         300
000240                          PRI05==         240
000200                          PRI04==         200
000140                          PRI03==         140
000100                          PRI02==         100
000040                          PRI01==         40
000000                          PRI00==         0
000004                          EVL==           4
000010                          LOT==           10
000020                          ADR==           20
000040                          IDU==           40
000100                          ISR==           100
000200                          UAM==           200
000400                          BOE==           400
001000                          PNT==           1000
002000                          PRI==           2000
004000                          IXE==           4000
010000                          IBE==           10000
020000                          IER==           20000
040000                          LOE==           40000
100000                          HOE==           -100000
004716                          T.21=           P.AAA
005012                          T.61=           P.AAB
005112                          PWR.OFF=        P.AAC
005202                          PWR.ON=         P.AAD
005272                          UNS.ERR=        P.AAE
005340                          VV.NOT.SET=     P.AAF
```

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                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA·<

        005414                  VV.CLEAR=           P.AAG
        005470                  NO.INIT=            P.AAH
        005570                  MB.DIS.ERR=         P.AAI
        005652                  WC.ERR=             P.AAJ
        005722                  W.ERR=              P.AAK
        005764                  VV.SET=             P.AAL
        006060                  PUP.BB=             P.AAM
        006150                  BB.VV.ERR=          P.AAN
        006242                  BB.INIT.ERR=        P.AAO
        006334                  BB.BB.ERR=          P.AAP
        006442                  FMT.1=              P.AAQ
        006506                  FMT.2=              P.AAR
        006574                  FMT.3=              P.AAS
        006620                  FMT.4=              P.AAT
        006650                  FMT.5=              P.AAU
        006752                  FMT.6=              P.AAV
        007002                  FMT.7=              P.AAW
        007030                  FMT.8=              P.AAX
        007064                  FMT.9=              P.AAY
        007116                  FMT.10=             P.AAZ
        007170                  FMT.11=             P.ABA
        007224                  FMT.12=             P.ABB
        007254                  FMT.13=             P.ABC
        007330                  FMT.14=             P.ABD
        007370                  FMT.15=             P.ABE
        007436                  FMT.16=             P.ABF
        007526                  FMT.17=             P.ABG
        007562                  FMT.18=             P.ABH
        007632                  FMT.19=             P.ABI
        007702                  FMT.20=             P.ABJ
        007754                  FMT.21=             P.ABK
        010026                  FMT.22=             P.ABL
        010072                  FMT.23=             P.ABM
        010142                  FMT.24=             P.ABN
        010166                  FMT.25=             P.ABO
        010206                  FMT.26=             P.ABP
        010240                  ONE.FMT=            P.ABQ
        010246                  TWO.FMT=            P.ABR
        010256                  THR.FMT=            P.ABS
        010270                  FOR.FMT=            P.ABT
        010304                  FIV.FMT=            P.ABU
        010322                  SIX.FMT=            P.ABV
        010342                  SEV.FMT=            P.ABW
        010364                  EIG.FMT=            P.ABX
        010410                  NIN.FMT=            P.ABY
        010436                  TEN.FMT=            P.ABZ
        010466                  ELV.FMT=            P.ACA
        010520                  WRD.1=              P.ACB
        010524                  WRD.2=              P.ACC
        010536                  WRD.3=              P.ACD
        010544                  WRD.4=              P.ACE
        010552                  WRD.5=              P.ACF
```

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                                ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                ;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<

        010560                  WRD.6=           P.ACG
        010566                  WRD.7=           P.ACH
        010602                  WRD.8=           P.ACI
        010616                  WRD.9=           P.ACJ
        010630                  WRD.10=          P.ACK
        010640                  WRD.11=          P.ACL
        010650                  WRD.12=          P.ACM
        010660                  WRD.13=          P.ACN
        010664                  WRD.14=          P.ACO
        010676                  WRD.15=          P.ACP
        010704                  WRD.16=          P.ACQ
        010712                  WRD.17=          P.ACR
        010724                  WRD.18=          P.ACS
        010730                  WRD.19=          P.ACT
        010736                  WRD.20=          P.ACU
        010744                  WRD.21=          P.ACV
        010752                  WRD.22=          P.ACW
        010766                  WRD.23=          P.ACX
        010774                  WRD.24=          P.ACY
        011002                  WRD.25=          P.ACZ
        011016                  WRD.26=          P.ADA
        011024                  WRD.27=          P.ADB
        011032                  WRD.29=          P.ADC
        011046                  WRD.30=          P.ADD
        011054                  WRD.31=          P.ADE
        011070                  WRD.32=          P.ADF
        011076                  WRD.33=          P.ADG
        011102                  WRD.34=          P.ADH
        011110                  WRD.35=          P.ADI
        011116                  WRD.36=          P.ADJ
        011122                  WRD.37=          P.ADK
        011132                  WRD.38=          P.ADL
        011140                  WRD.39=          P.ADM
        011150                  WRD.40=          P.ADN
        011154                  WRD.41=          P.ADO
        011170                  WRD.42=          P.ADP
        011176                  WRD.43=          P.ADQ
        011206                  WRD.44=          P.ADR
        011214                  WRD.45=          P.ADS
        011226                  WRD.46=          P.ADT
        011240                  WRD.47=          P.ADU
        011250                  WRD.48=          P.ADV
        011260                  WRD.49=          P.ADW
        011270                  WRD.50=          P.ADX
        011276                  WRD.51=          P.ADY
        011310                  WRD.52=          P.ADZ
        011316                  WRD.53=          P.AEA
        011326                  WRD.54=          P.AEB
        011336                  WRD.55=          P.AEC
        011344                  WRD.56=          P.AED
        011352                  WRD.57=          P.AEE
        011362                  WRD.58=          P.AEF
```

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                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;                ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03    PA:<

        011374                  WRD.59=          P.AEG
        011400                  WRD.60=          P.AEH
        011416                  WRD.61=          P.AEI
        011432                  WRD.62=          P.AEJ
        011440                  WRD.63=          P.AEK
        011446                  WRD.64=          P.AEL
        011454                  WRD.65=          P.AEM
        011462                  WRD.67=          P.AEN
        011470                  WRD.68=          P.AEO
        011474                  WRD.69=          P.AEP
        011502                  WRD.70=          P.AEQ
        011514                  WRD.71=          P.AER
        011524                  WRD.72=          P.AES
        011532                  WRD.73=          P.AET
        011540                  WRD.74=          P.AEU
        011552                  WRD.75=          P.AEV
        011562                  WRD.76=          P.AEW
        011570                  WRD.77=          P.AEX
        011610                  PHR.1=           P.AEY
        011626                  PHR.2=           P.AEZ
        011644                  PHR.3=           P.AFA
        011676                  PHR.4=           P.AFB
        011714                  PHR.5=           P.AFC
        011726                  PHR.6=           P.AFD
        011740                  PHR.7=           P.AFE
        011762                  PHR.8=           P.AFF
        011774                  PHR.9=           P.AFG
        012006                  PHR.10=          P.AFH
        012020                  PHR.11=          P.AFI
        012036                  PHR.12=          P.AFJ
        012060                  PHR.13=          P.AFK
        012104                  PHR.14=          P.AFL
        012136                  PHR.15=          P.AFM
        012150                  FNC.1=           P.AFN
        012164                  FNC.2=           P.AFO
        012172                  FNC.3=           P.AFP
        012200                  FNC.4=           P.AFQ
        012216                  FNC.5=           P.AFR
        012226                  FNC.6=           P.AFS
        012234                  FNC.7=           P.AFT
        012244                  FNC.8=           P.AFU
        012260                  FNC.9=           P.AFV
        012272                  FNC.10=          P.AFW
        012302                  FNC.11=          P.AFX
        012322                  FNC.12=          P.AFY
        012334                  FNC.13=          P.AFZ
        012344                  FNC.14=          P.AGA
        012360                  FNC.15=          P.AGB
        012372                  FNC.16=          P.AGC
        012404                  FNC.17=          P.AGD
        012414                  FNC.18=          P.AGE
        012426                  FNC.19=          P.AGF
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

        012440                          FNC.21=             P.AGG
        012452                          FNC.22=             P.AGH
        012464                          FNC.23=             P.AGI
        012500                          REG.1=              P.AGJ
        012510                          REG.2=              P.AGK
        012516                          REG.3=              P.AGL
        012524                          REG.4=              P.AGM
        012532                          REG.5=              P.AGN
        012540                          REG.6=              P.AGO
        012546                          REG.7=              P.AGP
        012554                          REG.8=              P.AGQ
        012562                          REG.9=              P.AGR
        012570                          REG.10=             P.AGS
        012576                          REG.11=             P.AGT
        012604                          REG.12=             P.AGU
        012612                          REG.13=             P.AGV
        012620                          REG.14=             P.AGW
        012626                          REG.15=             P.AGX
        012634                          REG.16=             P.AGY
        012642                          REG.17=             P.AGZ
        012652                          REG.18=             P.AHA
        012660                          REG.19=             P.AHB
        012666                          REG.20=             P.AHC
        012676                          REG.21=             P.AHD
        012706                          ASYNC=              P.AHE
        012750                          SYNC=               P.AHF
        013012                          ARR.DAT=            P.AHG
        013052                          MEM.ARR=            P.AHH
        013114                          INTER=              P.AHI
        013154                          DATA.LATE=          P.AHJ
        013214                          SC.SET=             P.AHK
        013250                          TRBLE.LOOP=         P.AHL
        013302                          RH.ERROR=           P.AHM
        013330                          TIME.OUT=           P.AHN
        013374                          D1.TEMP=            NIB.SAVE
        013376                          D2.TEMP=            NIB.SAVE+2
        013400                          E2.TEMP=            NIB.SAVE+4


                                                .SBTTL  LOAD.STACK ROUTINE DECLARATION SECTION

016034                                  LOAD.STACK:
016034  004167  166514                          JSR     R1,$SAVE3                       ;                                2267
016040  016601  000012                          MOV     12(SP),R1                       ; NIB.PTR,*                      2322
016044  012702  015022                          MOV     #STK.OFF,R2
016050  060102                                  ADD     R1,R2
016052  016601  000014                          MOV     14(SP),R1                       ; STK.PTR,*
016056  016600  000012                          MOV     12(SP),R0                       ; NIB.PTR,*                      2318
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

016062  006300                                  ASL     R0
016064  066007  016070                          ADD     1$(R0),PC
016070  000024                          1$:     .WORD   2$-1$
016072  000042                                  .WORD   3$-1$
016074  000060                                  .WORD   4$-1$
016076  000076                                  .WORD   5$-1$
016100  000114                                  .WORD   6$-1$
016102  000132                                  .WORD   7$-1$
016104  000160                                  .WORD   9$-1$
016106  000176                                  .WORD   10$-1$
016110  000224                                  .WORD   12$-1$
016112  000260                                  .WORD   15$-1$
016114  005003                          2$:     CLR     R3                      ;                       2322
016116  151203                                  BISB    (R2),R3
016120  010100                                  MOV     R1,R0
016122  160300                                  SUB     R3,R0
016124  016703  175244                          MOV     NIB.SAVE,R3
016130  000500                                  BR      14$
016132  005003                          3$:     CLR     R3                      ;                       2326
016134  151203                                  BISB    (R2),R3
016136  010100                                  MOV     R1,R0
016140  160300                                  SUB     R3,R0
016142  016703  175226                          MOV     NIB.SAVE,R3
016146  000433                                  BR      8$
016150  005003                          4$:     CLR     R3                      ;                       2330
016152  151203                                  BISB    (R2),R3
016154  010100                                  MOV     R1,R0
016156  160300                                  SUB     R3,R0
016160  016703  175210                          MOV     NIB.SAVE,R3
016164  000461                                  BR      13$
016166  005003                          5$:     CLR     R3                      ;                       2334
016170  151203                                  BISB    (R2),R3
016172  010100                                  MOV     R1,R0
016174  160300                                  SUB     R3,R0
016176  016703  175172                          MOV     NIB.SAVE,R3
016202  000437                                  BR      11$
016204  005003                          6$:     CLR     R3                      ;                       2338
016206  151203                                  BISB    (R2),R3
016210  010100                                  MOV     R1,R0
016212  160300                                  SUB     R3,R0
016214  016703  175156                          MOV     NIB.SAVE+2,R3
016220  000444                                  BR      14$
016222  005003                          7$:     CLR     R3                      ;                       2342
016224  151203                                  BISB    (R2),R3
016226  010100                                  MOV     R1,R0
016230  160300                                  SUB     R3,R0
016232  016703  175140                          MOV     NIB.SAVE+2,R3
016236  006203                          8$:     ASR     R3
016240  006203                                  ASR     R3
016242  006203                                  ASR     R3
016244  006203                                  ASR     R3
016246  000431                                  BR      14$
```

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                                        ;ML4AD                                  29-Mar-1982 16:27:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION  29-Mar-1982 16:21:03    PA:<
                                        ;
016250  005003                  9$:     CLR     R3                      ;                               2346
016252  151203                          BISB    (R2),R3
016254  010100                          MOV     R1,R0
016256  160300                          SUB     R3,R0
016260  016703  175112                  MOV     NIB.SAVE+2,R3
016264  000421                          BR      13$
016266  005003                  10$:    CLR     R3                      ;                               2350
016270  151203                          BISB    (R2),R3
016272  010100                          MOV     R1,R0
016274  160300                          SUB     R3,R0
016276  016703  175074                  MOV     NIB.SAVE+2,R3
016302  006203                  11$:    ASR     R3
016304  006203                          ASR     R3
016306  006203                          ASR     R3
016310  006203                          ASR     R3
016312  000406                          BR      13$
016314  005003                  12$:    CLR     R3                      ;                               2354
016316  151203                          BISB    (R2),R3
016320  010100                          MOV     R1,R0
016322  160300                          SUB     R3,R0
016324  016703  175050                  MOV     NIB.SAVE+4,R3
016330  000303                  13$:    SWAB    R3
016332  042703  177760          14$:    BIC     #177760,R3
016336  105060  015034                  CLRB    STACK(R0)
016342  150360  015034                  BISB    R3,STACK(R0)
016346  000207                          RTS     PC                      ;                               2318
016350  005003                  15$:    CLR     R3                      ;                               2358
016352  151203                          BISB    (R2),R3
016354  160301                          SUB     R3,R1
016356  016703  175016                  MOV     NIB.SAVE+4,R3
016362  006203                          ASR     R3
016364  006203                          ASR     R3
016366  006203                          ASR     R3
016370  006203                          ASR     R3
016372  000303                          SWAB    R3
016374  042703  177770                  BIC     #177770,R3
016400  105061  015034                  CLRB    STACK(R1)
016404  150361  015034                  BISB    R3,STACK(R1)
016410  000207                          RTS     PC                      ;                               2267

                                        ; Routine Size:  119 words
                                        ; Maximum stack depth per invocation:  4 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (5)

;          2363  routine DAT_DM_XFER : novalue =
;          2364
;          2365  !++
;          2366  ! FUNCTIONAL DESCRIPTION:
;          2367  !
;          2368  !       A REPEATEDLY CALLED SEQUENCE
;          2369  !       OF ASSIGNMENT EXPRESSIONS TO
;          2370  !       LOAD THE DSA, BUS ADRS  AND WORD
;          2371  !       COUNT REGISTERS WITH APPROPRIATE
;          2372  !       INFORMATION BEFORE A MASS BUS
;          2373  !       TRANSFER CAN COMMENCE
;          2374  !
;          2375  !       LOADS A MASS BUS BLOCK TRANSFER,
;          2376  !       IN DIAGNOSTIC MODE, AT THE GOOD
;          2377  !       BLOCK ADRS.
;          2378  !
;          2379  !--
;          2380
;          2381      begin
;          2382      DAT_DM = ONE;                                      !SET DATA DIAG MODE
;          2383      MLDA = .GOOD_BLK;                                  !LOAD DSA REG WITH THE GOOD BLOCK ADRS
;          2384      MLBA = IO_BUF;                                     !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
;          2385      MLWC = not 255;                                    !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2386      end;

                                        .SBTTL  DAT.DM.XFER ROUTINE DECLARATION SECTION
016412                            DAT.DM.XFER:
016412  152777  000010  177104          BISB    #10,@ML.REG+120                 ;                                2382
016420  016777  175362  177006          MOV     GOOD.BLK,@ML.REG+30             ;                                2383
016426  012777  014022  176770          MOV     #IO.BUF,@ML.REG+20              ;                                2384
016434  012777  177400  176752          MOV     #-400,@ML.REG+10                ;                                2385
016442  000207                          RTS     PC                              ;                                2363

                                  ; Routine Size:  13 words
                                  ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (6)
;
;          2387  routine STRIPPER (WRD_CNT, NIB_CNT) : novalue =
;          2388      begin
;          2389
;          2390  !++
;          2391  ! FUNCTIONAL DESCRIPTION:
;          2392  !       STRIPPER RUNS IN DATA DIAG MODE AND STRIPS OUT
;          2393  !       A VARIABLE NUMBER OF GOOD NIBBLES FROM THE
;          2394  !       GOOD BLOCK AND STORES THEM INTO A CONTIGIOUS
;          2395  !       STACK FOR SEQUENTIAL ACCESSING
;          2396  !
;          2397  ! FORMAL PARAMETERS:
;          2398  !       WRD_CNT
;          2399  !       TELLS STRIPPER HOW MANY WORDS IN THE GOOD
;          2400  !       BLOCK TO READ OUT
;          2401  !
;          2402  !       NIB_CNT
;          2403  !       TELLS STRIPPER HOW MANY NIBBLES TO
;          2404  !       STRIP OUT OF EACH WORD.
;          2405  !
;          2406  ! IMPLICIT INPUTS:
;          2407  !--
;          2408
;          2409      local
;          2410          STK_PTR;                                !STACK POINTER
;          2411
;          2412      incr CNT from 0 to .NIB_CNT do              !CLEAR OUT THE STACK OFFSETS
;          2413          STK_OFF [.CNT] = ZEROES;
;          2414
;          2415      CLR_MBUS;
;          2416      STK_PTR = -1;                               !RESET THE STACK POINTER
;          2417      DAT_DM_XFER ();                             !SET UP A DATA XFER AT THE GOOD BLOCK
;          2418      MLCS1 = read;                               !DO A READ XFER
;          2419      DELAY (ONE_US);                             !ALLOW PROM DATA TO GET INTO THE MLPD REG
;          2420
;          2421      incr CNT from 0 to .WRD_CNT do              !LOAD THE STACK WITH ALL GOOD NIBBLE DATA
;          2422          begin
;          2423          PD_TEMP = .MLPD;                        !GET THE PROM DATA
;          2424          DAT_CLK = ONE;                          !CLOCK OUT THE DATA WORD
;          2425          DELAY (ONE_US);                         !
;          2426          RD_LNG_WRD;                             !READ DATA DIAG REGS INTO NIBBLE SAVE
;          2427
;          2428          incr NIB_PTR from 0 to .NIB_CNT do      !STRIP OUT X NUMBER OF NIBBLES
;          2429              begin
;          2430              STK_PTR = .STK_PTR + 1;             !INCREMENT THE STACK POINTER
;          2431
;          2432              if .PD_TEMP [.NIB_PTR] IS_SET       !SEE IF THIS A GOOD NIBBLE
;          2433              then
;          2434                  STK_OFF [.NIB_PTR] = (.STK_OFF [.NIB_PTR]) + (.NIB_CNT + 1)
;          2435                                                  !THEN INCREMENT IT'S STACK OFFSET
;          2436              else
;          2437                  LOAD_STACK (.STK_PTR, .NIB_PTR);        !ELSE LOAD THE NIBBLE IN THE STACK
;          2438
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (6)

```
3018 ;ML4AD
3019 ;                  ROUTINE DECLARATION SECTION
3020
3021 ;          2439            end;
3022 ;          2440
3023 ;          2441        end;
3024 ;          2442
3025 ;          2443    CLR_MBUS;
3026 ;          2444    end;
3030
3031                                        .GLOBL  L$DLY
3032
3033
3034                                        .SBTTL  STRIPPER ROUTINE DECLARATION SECTION
3038 016444                            STRIPPER:
3039 016444  004167  166142                 JSR     R1,$SAVE5                       ;                               2387
3040 016450  005746                         TST     -(SP)
3041 016452  016604  000020                 MOV     20(SP),R4                       ; NIB.CNT,*                     2412
3042 016456  005001                         CLR     R1                              ; CNT
3043 016460  000403                         BR      2$
3044 016462  105061  015022          1$:    CLRB    STK.OFF(R1)                     ; *(CNT)                        2413
3045 016466  005201                         INC     R1                              ; CNT                           2412
3046 016470  020104                  2$:    CMP     R1,R4                           ; CNT,*
3047 016472  003773                         BLE     1$
3048 016474  152777  000040  176742         BISB    #40,@ML.REG+40                  ;                               2413
3049 016502  016705  177324                 MOV     ML.DUT,R5
3050 016506  042705  177770                 BIC     #177770,R5
3051 016512  142777  000007  176724         BICB    #7,@ML.REG+40
3052 016520  150577  176720                 BISB    R5,@ML.REG+40
3053 016524  012705  177777                 MOV     #-1,R5                          ; *,STK.PTR                     2416
3054 016530  004767  177656                 JSR     PC,DAT.DM.XFER                  ;                               2417
3055 016534  012777  000071  176642         MOV     #71,@ML.REG                     ;                               2418
3056 016542  012701  000001                 MOV     #1,R1                           ; *,$STMP2                      2419
3057 016546  001410                  3$:    BEQ     6$
3058 016550  016702  163342                 MOV     L$DLY,R2                        ; *,$STMP1
3059 016554  001403                         BEQ     5$
3060 016556  005016                  4$:    CLR     (SP)                            ; $STMP
3061 016560  005302                         DEC     R2                              ; $STMP1
3062 016562  001375                         BNE     4$
3063 016564  005301                  5$:    DEC     R1                              ; $STMP2
3064 016566  000767                         BR      3$
3065 016570  005003                  6$:    CLR     R3                              ; CNT                           2421
3066 016572  000502                         BR      16$
3067 016574  017767  177034  176540  7$:    MOV     @ML.REG+230,PD.TEMP             ;                               2423
3068 016602  152777  000020  176714         BISB    #20,@ML.REG+120                 ;                               2424
3069 016610  012701  000001                 MOV     #1,R1                           ; *,$STMP2                      2425
3070 016614  001410                  8$:    BEQ     11$
3071 016616  016702  163274                 MOV     L$DLY,R2                        ; *,$STMP1
3072 016622  001403                         BEQ     10$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

016624  005016                          9$:     CLR     (SP)                            ; $$TMP
016626  005302                                  DEC     R2                              ; $$TMP1
016630  001375                                  BNE     9$
016632  005301                          10$:    DEC     R1                              ; $$TMP2
016634  000767                                  BR      8$
016636  017767  176732  174530          11$:    MOV     @ML.REG+170,D1.TEMP
016644  017767  176734  174524                  MOV     @ML.REG+200,D2.TEMP
016652  017767  176706  174520                  MOV     @ML.REG+160,E2.TEMP
016660  005002                                  CLR     R2                              ; NIB.PTR                       2428
016662  000443                                  BR      15$
016664  005205                          12$:    INC     R5                              ; STK.PTR                       2430
016666  010201                                  MOV     R2,R1                           ; NIB.PTR,*                     2432
016670  006201                                  ASR     R1
016672  006201                                  ASR     R1
016674  006201                                  ASR     R1
016676  062701  015342                          ADD     #PD.TEMP,R1
016702  010146                                  MOV     R1,-(SP)
016704  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*
016706  042716  177770                          BIC     #177770,(SP)
016712  012746  000001                          MOV     #1,-(SP)
016716  005046                                  CLR     -(SP)
016720  004767  164710                          JSR     PC,BL$GT2
016724  062706  000010                          ADD     #10,SP
016730  005300                                  DEC     R0
016732  001011                                  BNE     13$
016734  005001                                  CLR     R1                              ;                               2434
016736  156201  015022                          BISB    STK.OFF(R2),R1                  ; *(NIB.PTR),*
016742  060401                                  ADD     R4,R1
016744  010100                                  MOV     R1,R0
016746  005200                                  INC     R0
016750  110062  015022                          MOVB    R0,STK.OFF(R2)                  ; *,*(NIB.PTR)
016754  000405                                  BR      14$                             ;                               2432
016756  010546                          13$:    MOV     R5,-(SP)                        ; STK.PTR,*                     2437
016760  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*
016762  004767  177046                          JSR     PC,LOAD.STACK
016766  022626                                  CMP     (SP)+,(SP)+
016770  005202                          14$:    INC     R2                              ; NIB.PTR                       2428
016772  020204                          15$:    CMP     R2,R4                           ; NIB.PTR,*
016774  003733                                  BLE     12$
016776  005203                                  INC     R3                              ; CNT                           2421
017000  020366  000022                  16$:    CMP     R3,22(SP)                       ; CNT,WRD.CNT
017004  003673                                  BLE     7$
017006  152777  000040  176430                  BISB    #40,@ML.REG+40                  ;                               2441
017014  016705  177012                          MOV     ML.DUT,R5
017020  042705  177770                          BIC     #177770,R5
017024  142777  000007  176412                  BICB    #7,@ML.REG+40
017032  150577  176406                          BISB    R5,@ML.REG+40
017036  005726                                  TST     (SP)+                           ;                               2387
017040  000207                                  RTS     PC

                                        ; Routine Size:  127 words
                                        ; Maximum stack depth per invocation:  11 words
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
```

```
;          2445  routine CAL_CRC : novalue =
;          2446      begin
;          2447
;          2448  !++
;          2449  ! FUNCTIONAL DESCRIPTION:
;          2450  !       CALCULATE THE CRC CODE FOR THE GOOD BLOCKS
;          2451  !       FIRST CRC GROUP (60 NIBBLES) BY STRIPPING
;          2452  !       OUT GOOD NIBBLES AND MODULO 2 ADDING EACH
;          2453  !       BITS WEIGHT RESULTING IN A_CAL,B_CAL,P_CAL.
;          2454  !
;          2455  ! IMPLICIT INPUTS:
;          2456  !       P_CAL,A_CAL,B_CAL
;          2457  !       GOLBAL STORAGE LOCATION WHERE CALCULATED
;          2458  !       CRC CODES ARE STORED AND EXAMINED FROM
;          2459  !
;          2460  !       REM_TBL
;          2461  !       TABLE CONTAINING PRECALCULATED BIT POSITION
;          2462  !       WEIGHTS USED IN THE MODULO 2 CALCULATION OF THE
;          2463  !       CRC CODE
;          2464  !--
;          2465
;          2466      local
;          2467          CHANNEL,                        !CHANNEL POINTS TO THE BITS IN A WORD
;          2468          STK_PTR,                        !STACK POINTER
;          2469          NIB_SAV : bitvector [4],        !NIBBLE SAVE LOCATION
;          2470          ALOG,                           !INDEX INTO REMAINDER TABLE
;          2471          BLOG;                           !INDEX INTO REMAINDER TABLE
;          2472
;          2473      STRIPPER (12, 9);                   !STRIP OUT ALL 10 NIBBLE FROM 13 ARRAY WORDS
;          2474      STK_PTR = -1;                       !RESET STACK POINTER
;          2475
;          2476      incr PLOG from 0 to 5 do            !PLOG POINTS TO ONE CRC GROUP '6 WORDS'
;          2477          begin
;          2478          CHANNEL = -1;                   !RESET CHANNEL FOR EACH WORD
;          2479
;          2480          incr NIB_CNT from 0 to 8 do     !READ DATA NIBBLE 0-8 AND CALCULATE CRC
;          2481              begin
;          2482              STK_PTR = .STK_PTR + 1;     !INCREMENT THE STACK POINTER
;          2483              NIB_SAV = .stack [.STK_PTR]; !LOAD NIV_SAV WITH A STACK NIBBLE
;          2484
;          2485              incr BIT_TST from 0 to 3 do !TEST THE BIT FOR BEING SET
;          2486                  begin
;          2487                  CHANNEL = .CHANNEL + 1; !CHANNEL POINTS TO THIS BIT
;          2488
;          2489                  if .NIB_SAV [.BIT_TST] IS_SET !SEE IF THIS BIT IS SET
;          2490                  then
;          2491                      begin               !IF SET THEN MOD 2 ADD THE REMAINDER
;          2492                      ALOG = .PLOG + .CHANNEL; !CALCULATE THE ALOG
;          2493                      BLOG = .PLOG + .CHANNEL*2; !CALCULATE THE BLOG
;          2494
;          2495                      while .ALOG geq 63 do !REDUCE ALOG UNTIL < 64
;          2496                          ALOG = .ALOG - 63;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (7)
;
;          2497
;          2498                    while .BLOG geq 63 do       !REDUCE BLOG UNTIL <64
;          2499                        BLOG = .BLOG - 63;
;          2500
;          2501                    P_CAL = (.P_CAL) xor (.REM_TBL [.PLOG]);     !MOD 2 P_CAL WITH REM_TBL
;          2502                    A_CAL = (.A_CAL) xor (.REM_TBL [.ALOG]);     !MOD 2 A_CAL WITH REM_TBL
;          2503                    B_CAL = (.B_CAL) xor (.REM_TBL [.BLOG]);     !MOD 2 B_CAL WITH REM_TBL
;          2504                    end;
;          2505
;          2506                end;
;          2507
;          2508            end;
;          2509
;          2510        STK_PTR = .STK_PTR + 1;              !SKIP OVER THE CRC NIB NT THE STACK
;          2511        end;
;          2512
;          2513    end;
;
                                    .SBTTL  CAL.CRC ROUTINE DFCLARATION SECTION
017042  004167  165544        CAL.CRC:JSR     R1,$SAVE5                       ;                       2445
017046  162706  000012                SUB     #12,SP
017052  012746  000014                MOV     #14,-(SP)                       ;                       2473
017056  012746  000011                MOV     #11,-(SP)
017062  004767  177356                JSR     PC,STRIPPER
017066  012766  177777  000006        MOV     #-1,6(SP)                       ; *,STK.PTR             2474
017074  005066  000004                CLR     4(SP)                           ; PLOG                  2476
017100  012766  177777  000010  1$:   MOV     #-1,10(SP)                      ; *,CHANNEL             2478
017106  005066  000012                CLR     12(SP)                          ; NIB.CNT               2480
017112  005266  000006          2$:   INC     6(SP)                           ; STK.PTR               2482
017116  016605  000006                MOV     6(SP),R5                        ; STK.PTR,*             2483
017122  116566  015034  000014        MOVB    STACK(R5),14(SP)                ; *,NIB.SAV
017130  105066  000015                CLRB    15(SP)                          ; NIB.SAV
017134  005003                        CLR     R3                              ; BIT.TST               2485
017136  005266  000010          3$:   INC     10(SP)                          ; CHANNEL               2487
017142  010305                        MOV     R3,R5                           ; BIT.TST,*             2489
017144  006205                        ASR     R5
017146  006205                        ASR     R5
017150  006205                        ASR     R5
017152  012704  000014                MOV     #14,R4
017156  060604                        ADD     SP,R4                           ; NIB.SAV,*
017160  060405                        ADD     R4,R5
017162  010546                        MOV     R5,-(SP)
017164  010346                        MOV     R3,-(SP)                        ; BIT.TST,*
017166  042716  177770                BIC     #177770,(SP)
017172  012746  000001                MOV     #1,-(SP)
017176  005046                        CLR     -(SP)
```

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                                        ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<

017200  0047o7  164430                        JSR     PC,BL$GT2
017204  062706  000010                        ADD     #10,SP
017210  005300                                DEC     R0
017212  001066                                BNE     7$
017214  016601  000004                        MOV     4(SP),R1                ; PLOG,ALOG                     2492
017220  066601  000010                        ADD     10(SP),R1               ; CHANNEL,ALOG
017224  016605  000010                        MOV     10(SP),R5               ; CHANNEL,*                     2493
017230  006305                                ASL     R5
017232  066605  000004                        ADD     4(SP),R5                ; PLOG,*
017236  010502                                MOV     R5,R2                   ; *,BLOG
017240  020127  000077            4$:         CMP     R1,#77                  ; ALOG,*                        2495
017244  002403                                BLT     5$
017246  162701  000077                        SUB     #77,R1                  ; *,ALOG                        2496
017252  000772                                BR      4$                      ;                               2495
017254  020227  000077            5$:         CMP     R2,#77                  ; BLOG,*                        2498
017260  002403                                BLT     6$
017262  162702  000077                        SUB     #77,R2                  ; *,BLOG                        2499
017266  000772                                BR      5$                      ;                               2498
017270  005005                    6$:         CLR     R5                      ;                               2501
017272  016604  000004                        MOV     4(SP),R4                ; PLOG,*
017276  156405  015664                        BISB    REM.TBL(R4),R5
017302  010546                                MOV     R5,-(SP)
017304  046716  176056                        BIC     P.CAL,(SP)
017310  040567  176052                        BIC     R5,P.CAL
017314  052667  176046                        BIS     (SP)+,P.CAL
017320  005005                                CLR     R5                      ;                               2502
017322  156105  015664                        BISB    REM.TBL(R1),R5          ; *(ALOG),*
017326  010504                                MOV     R5,R4
017330  046704  176026                        BIC     A.CAL,R4
017334  040567  176022                        BIC     R5,A.CAL
017340  050467  176016                        BIS     R4,A.CAL
017344  005005                                CLR     R5                      ;                               2503
017346  156205  015664                        BISB    REM.TBL(R2),R5          ; *(BLOG),*
017352  010504                                MOV     R5,R4
017354  046704  176004                        BIC     B.CAL,R4
017360  040567  176000                        BIC     R5,B.CAL
017364  050467  175774                        BIS     R4,B.CAL
017370  005203                    7$:         INC     R3                      ; BIT.TST                       2485
017372  020327  000003                        CMP     R3,#3                   ; BIT.TST,*
017376  003657                                BLE     3$
017400  005266  000012                        INC     12(SP)                  ; NIB.CNT                       2480
017404  026627  000012  000010                CMP     12(SP),#10              ; NIB.CNT,*
017412  003637                                BLE     2$
017414  005266  000006                        INC     6(SP)                   ; STK.PTR                       2510
017420  005266  000004                        INC     4(SP)                   ; PLOG                          2476
017424  026627  000004  000005                CMP     4(SP),#5                ; PLOG,*
017432  003622                                BLE     1$
017434  062706  000016                        ADD     #16,SP                  ;                               2445
017440  000207                                RTS     PC

                                        ; Routine Size:  128 words
                                        ; Maximum stack depth per invocation:  17 words
```

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                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;       ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (8)
;
;          2514  routine ERR_CHK_CRC =
;          2515      begin
;          2516
;          2517  !++
;          2518  ! FUNCTIONAL DESCRIPTION:
;          2519  !       'ERROR CHECK CRC' COMPARES HARDWARE GENERATED CRC
;          2520  !       CODES TO SOFTWARE CALCULATED CRC CODE FOR ONE
;          2521  !       CRC GROUP AND RETURNS A ONE ON DETECTION OF ERRORS
;          2522  !
;          2523  ! IMPLICIT INPUTS:
;          2524  !       P_CAL,A_CAL,B_CAL
;          2525  !       GLOBAL STORAGE LOCATIONS WHERE CALCULATED
;          2526  !       CRC CODES ARE STORED AND EXAMINED FROM
;          2527  !
;          2528  !       P_GEN,A_GEN,B_GEN
;          2529  !       GLOBAL STROAGE LOCATIONS WHERE HARDWARE GENERATED
;          2530  !       CRC CODES ARE STORED AND EXAMINED FROM
;          2531  !--
;          2532
;          2533      local
;          2534          POS,                                  !VARIABLE FOR FIELD SELECTOR
;          2535          TEMP;                                 !TEMPORARY STORAGE LOCATION
;          2536
;          2537      POS = -1;                                 !RESET THE POS
;          2538
;          2539      incr STK_PTR from 9 to 59 by 10 do        !CONVERT VERTICAL STACK CRC TO HORIZONTAL REPRESENTATION
;          2540          begin
;          2541          POS = .POS + 1;                       !INCREMENT POS
;          2542          TEMP = .stack [.STK_PTR];             !READ CRC NIB FROM THE STACK
;          2543          (P_GEN)<.POS, 1> = .TEMP<0, 1>;       !CONVERT 1ST BIT
;          2544          (A_GEN)<.POS, 1> = not .TEMP<1, 1>;   !CONVERT 2ND BIT
;          2545          (B_GEN)<.POS, 1> = not .TEMP<2, 1>;   !CONVERT 3ED BIT
;          2546          end;
;          2547
;          2548      if (.P_GEN neq .P_CAL) or (.A_GEN neq .A_CAL) or (.B_GEN neq .B_CAL) then return ONE else return ZERO;
;          2549
;          2550                                                !COMPARE GENERATED CRC CODE TO CALCULATED CRC CODE
;          2551      end;
;
;                                  .SBTTL  ERR.CHK.CRC ROUTINE DECLARATION SECTION
3367 017442                 ERR.CHK.CRC:
3368 017442  004167  165106            JSR     R1,$SAVE3                       ;                               2514
3369 017446  012701  177777            MOV     #-1,R1                          ; *,POS                         2537
3370 017452  012702  000011            MOV     #11,R2                          ; *,STK.PTR                     2539
3371 017456  005201                 1$: INC     R1                              ; POS                           2541
3372 017460  005003                     CLR     R3                              ; TEMP                          2542
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

017462  156203  015034                          BISB    STACK(R2),R3                    ; *(STK.PTR),TEMP
017466  012746  015374                          MOV     #P.GEN,-(SP)                    ;                                2543
017472  010146                                  MOV     R1,-(SP)                        ; POS,*
017474  012746  000001                          MOV     #1,-(SP)
017500  010346                                  MOV     R3,-(SP)                        ; TEMP,*
017502  042716  177776                          BIC     #177776,(SP)
017506  004767  164360                          JSR     PC,BL$PU2
017512  012716  015370                          MOV     #A.GEN,(SP)                     ;                                2544
017516  010146                                  MOV     R1,-(SP)                        ; POS,*
017520  012746  000001                          MOV     #1,-(SP)
017524  005046                                  CLR     -(SP)
017526  032703  000002                          BIT     #2,R3                           ; *,TEMP
017532  001401                                  BEQ     2$
017534  005216                                  INC     (SP)
017536  005116                          2$:     COM     (SP)
017540  004767  164326                          JSR     PC,BL$PU2
017544  012716  015372                          MOV     #B.GEN,(SP)                     ;                                2545
017550  010146                                  MOV     R1,-(SP)                        ; POS,*
017552  012746  000001                          MOV     #1,-(SP)
017556  005046                                  CLR     -(SP)
017560  032703  000004                          BIT     #4,R3                           ; *,TEMP
017564  001401                                  BEQ     3$
017566  005216                                  INC     (SP)
017570  005116                          3$:     COM     (SP)
017572  004767  164274                          JSR     PC,BL$PU2
017576  062706  000024                          ADD     #24,SP                          ;                                2540
017602  062702  000012                          ADD     #12,R2                          ; *,STK.PTR                      2539
017606  020227  000073                          CMP     R2,#73                          ; STK.PTR,*
017612  003721                                  BLE     1$
017614  026767  175554  175544                  CMP     P.GEN,P.CAL                     ;                                2548
017622  001010                                  BNE     4$
017624  026767  175540  175530                  CMP     A.GEN,A.CAL
017632  001004                                  BNE     4$
017634  026767  175532  175522                  CMP     B.GEN,B.CAL
017642  001403                                  BEQ     5$
017644  012701  000001                  4$:     MOV     #1,R1
017650  000401                                  BR      6$
017652  005001                          5$:     CLR     R1
017654  010100                          6$:     MOV     R1,R0                           ;                                2515
017656  000207                                  RTS     PC                              ;                                2514

                                        ; Routine Size:  71 words
                                        ; Maximum stack depth per invocation:  14 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (9)

;          2552  routine FIND_COMP_BIT (BITS_XFERED) =
;          2553      begin
;          2554
;          2555  !++
;          2556  ! FUNCTIONAL DESCRIPTION:
;          2557  !       'FIND COMPLIMENT'  BIT IS CALLED BY THE
;          2558  !       SYNDROME DECODE TESTS AND INDEXES INTO
;          2559  !       THE IO_BUF LOOKING FOR COMPLIMENTED
;          2560  !       BITS.  A COMPLIMENTED BIT IS BY DEF A ONE
;          2561  !
;          2562  !       A ONE IS RETURNED IF THE INDEXED BIT IS
;          2563  !       NOT SET
;          2564  !
;          2565  ! FORMAL PARAMETERS:
;          2566  !       BITS_XFERED
;          2567  !       REPRESENTS THE BIT BEING TESTED
;          2568  !       IN THE DRIVE AND FROM THIS THE
;          2569  !       WORD AND BIT INDEX INTO THE
;          2570  !       IO_BUF CAN BE CALCULATED
;          2571  !
;          2572  ! IMPLICIT INPUTS:
;          2573  !--
;          2574
;          2575      local
;          2576          COMP_WRD,                        !WORD WHERE COMPLINEMT BIT IS LOCATED
;          2577          COMP_BIT,                        !BIT THAT IS COMPLINEMTED
;          2578          BUF_SAV : bitvector [16];        !STORES THE WORD IN WHICH THE BIT IS COMPLIMENTED
;          2579
;          2580      COMP_WRD = .BITS_XFERED/16;          !CALCULATE THE COMP WORD
;          2581      COMP_BIT = .BITS_XFERED mod 16;      !CALCULATE THE COMP BIT
;          2582      BUF_SAV = .IO_BUF [.COMP_WRD];       !LOAD THE COMP WORD INTO BUF_SAV
;          2583      IO_BUF [.COMP_WRD] = ZEROES;         !ZERO THE COMP WORD
;          2584
;          2585      if .BUF_SAV [.COMP_BIT] IS_NOT_SET then return ZERO else return ONE;
;          2586
;          2587                                           !FIND COMPLIMENTED BIT AND RETURN ERROR STATUS
;          2588      end;

                                    .SBTTL  FIND.COMP.BIT ROUTINE DECLARATION SECTION
017660                      FIND.COMP.BIT:
017660  004167  164654              JSR     R1,$SAVE2                       ;                               2552
017664  005746                      TST     -(SP)
017666  016646  000012              MOV     12(SP),-(SP)                    ; BITS.XFERED,*                 2580
017672  012746  000020              MOV     #20,-(SP)
017676  004767  164544              JSR     PC,BL$DIV
017702  010001                      MOV     R0,R1                           ; *,COMP.WRD
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

017704  016616  000016                          MOV     16(SP),(SP)                     ; BITS.XFERED,*                 2581
017710  012746  000020                          MOV     #20,-(SP)
017714  004767  164540                          JSR     PC,BL$MOD
017720  010002                                  MOV     R0,R2                           ; *,COMP.BIT
017722  010100                                  MOV     R1,R0                           ; COMP.WRD,*                    2582
017724  006300                                  ASL     R0
017726  016066  014022  000006                  MOV     IO.BUF(R0),6(SP)                ; *,BUF.SAV
017734  005060  014022                          CLR     IO.BUF(R0)                      ;                               2583
017740  010200                                  MOV     R2,R0                           ; COMP.BIT,*                    2585
017742  006200                                  ASR     R0
017744  006200                                  ASR     R0
017746  006200                                  ASR     R0
017750  012701  000006                          MOV     #6,R1
017754  060601                                  ADD     SP,R1                           ; BUF.SAV,*
017756  060100                                  ADD     R1,R0
017760  010046                                  MOV     R0,-(SP)
017762  010246                                  MOV     R2,-(SP)                        ; COMP.BIT,*
017764  042716  177770                          BIC     #177770,(SP)
017770  012746  000001                          MOV     #1,-(SP)
017774  005046                                  CLR     -(SP)
017776  004767  163632                          JSR     PC,BL$GT2
020002  062706  000010                          ADD     #10,SP
020006  005700                                  TST     R0
020010  001002                                  BNE     1$
020012  005001                                  CLR     R1
020014  000402                                  BR      2$
020016  012701  000001                  1$:     MOV     #1,R1
020022  010100                          2$:     MOV     R1,R0                           ;                               2553
020024  062706  000010                          ADD     #10,SP                          ;                               2552
020030  000207                                  RTS     PC

                                        ; Routine Size:  53 words
                                        ; Maximum stack depth per invocation:  11 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (10)

                2589  routine FORCE_REM (PLOG, CHAN) : novalue =
                2590      begin
                2591
                2592  !++
                2593  ! FUNCTIONAL DESCRIPTION:
                2594  !       VIA ECC_DM AND THE PRECALCULATED MODULO 2
                2595  !       REMAINDERS STORED IN REM_TBL[], THE
                2596  !       CRC_A,CRC_B AND PAR_CRC_WRD
                2597  !       ARE FORCED WITH ERRONEOUS CRC DATA TO
                2598  !       FORCE PERDICTABLE ECC ERRORS
                2599  !
                2600  ! FORMAL PARAMETERS:
                2601  !       PLOG
                2602  !       POINTS TO ONE OF THE SIX WORDS OF
                2603  !       A CRC GROUP
                2604  !
                2605  !       CHAN
                2606  !       POINTS TO ONE OF 36 CHANNELS IN
                2607  !       A CRC GROUP
                2608  !
                2609  ! IMPLICIT INPUTS:
                2610  !--
                2611
                2612      local
                2613          TMP_E1,                          !TEMP STORAGE FOR E1 DATA WORD
                2614          ALOG,                            !INDEX INTO REM_TBL
                2615          BLOG;                            !INDEX INTO REM_TBL
                2616
                2617      ALOG = .PLOG + .CHAN;                !CALCULATE A_LOG
                2618      BLOG = .PLOG + .CHAN*2;              !CALCULATE B_LOG
                2619
                2620      while .ALOG geq 63 do                !REDUCE A_LOG UNTIL < 64
                2621          ALOG = .ALOG - 63;
                2622
                2623      while .BLOG geq 63 do                !REDUCE B_LOG UNTIL < 64
                2624          BLOG = .BLOG - 63;
                2625
                2626      ECC_DM = ONE;                        !SET ECC DIAG MODE
                2627  !+
                2628  ! THE FOLLOWING ASSIGNMENT:
                2629  !
                2630  !       MLE1 = .TMP_E1
                2631  !
                2632  ! IS EQUIVALENT TO THE FOLLOWING
                2633  ! TWO ASSINGMENTS:
                2634  !
                2635  !   PAR_CRC_WRD = .REM_TBL [.PLOG];      !LOAD PAR_CRC_WRD WITH REM_TBL
                2636  !   CRC_A = .REM_TBL [.ALOG];            !LOAD CRC_A WITH REM_TBL
                2637  !
                2638  ! THIS IS NECESSARY DUE TO THE FACT THAT
                2639  ! THE E1 REGISTER IS WORD ORIENTATED AND
                2640  ! THE BLISS COMPILER GENERATES BYTE INST
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (10)

;          2641  ! TO ACCESS THE REGISTER.
;          2642  !-
;          2643
;          2644      TMP_E1 = ZEROES;                          !CLEAR OUT THE TEMP WORD
;          2645      TMP_E1<0, 6> = .REM_TBL [.ALOG];          !LOAD CRC_A WITH REM_TBL
;          2646      TMP_E1<8, 6> = .REM_TBL [.PLOG];          !LOAD PAR_CRC_WRD WITH REM_TBL
;          2647      MLET = .TMP_E1;                           !LOAD THE E1 REGISTER WITH DATA
;          2648
;          2649      CRC_B = .REM_TBL [.BLOG];                 !LOAD CRC_B WITH REM_TBL
;          2650      end;

                                        .SBTTL  FORCE.REM ROUTINE DECLARATION SECTION
020032                          FORCE.REM:
020032  004167  164534                  JSR     R1,$SAVE4                       ;                                2589
020036  016601  000016                  MOV     16(SP),R1                       ; PLOG,*                         2617
020042  010100                          MOV     R1,R0                           ; *,ALOG
020044  066600  000014                  ADD     14(SP),R0                       ; CHAN,ALOG
020050  016602  000014                  MOV     14(SP),R2                       ; CHAN,*                         2618
020054  006302                          ASL     R2
020056  060102                          ADD     R1,R2
020060  010203                          MOV     R2,R3                           ; *,BLOG
020062  020027  000077          1$:     CMP     R0,#77                          ; ALOG,*                         2620
020066  002403                          BLT     2$
020070  162700  000077                  SUB     #77,R0                          ; *,ALOG                         2621
020074  000772                          BR      1$                              ;                                2620
020076  020327  000077          2$:     CMP     R3,#77                          ; BLOG,*                         2623
020102  002403                          BLT     3$
020104  162703  000077                  SUB     #77,R3                          ; *,BLOG                         2624
020110  000772                          BR      2$                              ;                                2623
020112  152777  000001  175404  3$:     BISB    #1,@ML.REG+120                  ;                                2626
020120  005002                          CLR     R2                              ; TMP.E1                         2644
020122  116004  015664                  MOVB    REM.TBL(R0),R4                  ; *(ALOG),*                      2645
020126  042704  177700                  BIC     #177700,R4
020132  142702  000077                  BICB    #77,R2                          ; *,TMP.E1
020136  050402                          BIS     R4,R2                           ; *,TMP.E1
020140  116104  015664                  MOVB    REM.TBL(R1),R4                  ;                                2646
020144  000304                          SWAB    R4
020146  042704  140377                  BIC     #140377,R4
020152  042702  037400                  BIC     #37400,R2                       ; *,TMP.E1
020156  050402                          BIS     R4,R2                           ; *,TMP.E1
020160  010277  175370                  MOV     R2,@ML.REG+150                  ; TMP.E1,*                       2647
020164  116304  015664                  MOVB    REM.TBL(R3),R4                  ; *(BLOG),*                      2649
020170  042704  177700                  BIC     #177700,R4
020174  142777  000077  175362          BICB    #77,@ML.REG+160
020202  150477  175356                  BISB    R4,@ML.REG+160
020206  000207                          RTS     PC                              ;                                2589
```

```
                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<


                                ; Routine Size:  55 words
                                ; Maximum stack depth per invocation:  5 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (11)

routine FOR_ECC_ERR (SGL, UNC) : novalue =
    begin

!++
! FUNCTIONAL DESCRIPTION:
!       'FORCE ECC ERROR' WHEN CALLED WILL FORCE
!       VIA ECC DIAG MODE, SINGLE BIT ECC ERRORS
!       OR UNCORRECTABLE ECC ERRORS INTO THE
!       ECC DIAGNOSTIC REGISTERS
!
! FORMAL PARAMETERS:
!       SGL
!       WHEN SET TO A ONE THIS
!       ROUTINE WILL FORCE SINGLE BIT ERRORS
!
!       UNC
!       WHEN SET TO A ONE THIS ROUTINE WILL
!       FORCE UNCORRECTABLE ECC ERRORS
!
! IMPLICIT INPUTS:
!--

    local
        TMP_E1;                                 !TEMP STORAGE FOR E1 DATA WORD

    ECC_DM = ONE;                               !SET ECC DIAG MODE

    if .SGL                                     !IF SGL IS TRUE
    then
        begin                                   !THEN FORCE A SINGLE BIT ERROR
!+
! THE FOLLOWING ASSIGNMENT:
!
!       MLE1 = .TMP_E1
!
! IS EQUIVALENT TO THE FOLLOWING
! TWO ASSINGMENTS:
!
!   PAR_CRC_WRD = %b'111111';           !LOAD PAR_CRC_WRD WITH REM_TBL
!   CRC_A = %b'000000';                 !LOAD CRC_A WITH REM_TBL
!
! THIS IS NECESSARY DUE TO THE FACT THAT
! THE E1 REGISTER IS WORD ORIENTATED AND
! THE BLISS COMPILER GENERATES BYTE INST
! TO ACCESS THE REGISTER.
!-

        TMP_E1 = ZEROES;                                !CLEAR OUT THE TEMP WORD
        TMP_E1<0, 6> = %b'000000';          !LOAD CRC_A WITH REM_TBL
        TMP_E1<8, 6> = %b'111111';          !LOAD PAR_CRC_WRD WITH REM_TBL
        MLE1 = .TMP_E1;                     !LOAD THE E1 REGISTER WITH DATA
;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (11)

;          2703          CRC_B = %b'000000';
;          2704          end
;          2705      else
;          2706          begin                          !ELSE FORCE A UNCORRECTABLE ERROR
;          2707      !+
;          2708      ! THE FOLLOWING ASSIGNMENT:
;          2709      !
;          2710      !       MLE1 = .TMP_E1
;          2711      !
;          2712      ! IS EQUIVALENT TO THE FOLLOWING
;          2713      ! TWO ASSINGMENTS:
;          2714      !
;          2715      !   PAR_CRC_WRD = %b'111111';          !LOAD PAR_CRC_WRD WITH REM_TBL
;          2716      !   CRC_A = %b'111111';                !LOAD CRC_A WITH REM_TBL
;          2717      !
;          2718      ! THIS IS NECESSARY DUE TO THE FACT THAT
;          2719      ! THE E1 REGISTER IS WORD ORIENTATED AND
;          2720      ! THE BLISS COMPILER GENERATES BYTE INST
;          2721      ! TO ACCESS THE REGISTER.
;          2722      !-
;          2723
;          2724          TMP_E1 = ZEROES;                        !CLEAR OUT THE TEMP WORD
;          2725          TMP_E1<0, 6> = %b'111111';         !LOAD CRC_A WITH REM_TBL
;          2726          TMP_E1<8, 6> = %b'111111';         !LOAD PAR_CRC_WRD WITH REM_TBL
;          2727          MLE1 = .TMP_E1;                    !LOAD THE E1 REGISTER WITH DATA
;          2728
;          2729          CRC_B = %b'000000';
;          2730          end;
;          2731
;          2732      end;
3743
3744                                    .SBTTL  FOR.ECC.ERR ROUTINE DECLARATION SECTION
3748 020210                        FOR.ECC.ERR:
3749 020210  152777  000001  175306          BISB    #1,@ML.REG+120          ;                       2676
3750 020216  005000                          CLR     R0                      ; TMP.E1                2698
3751 020220  032766  000001  000004          BIT     #1,4(SP)                ; *,SGL                 2678
3752 020226  001403                          BEQ     1$
3753 020230  142700  000077                  BICB    #77,R0                  ; *,TMP.E1              2699
3754 020234  000402                          BR      2$                      ;                       2700
3755 020236  152700  000077          1$:     BISB    #77,R0                  ; *,TMP.E1              2725
3756 020242  052700  037400          2$:     BIS     #37400,R0               ; *,TMP.E1              2726
3757 020246  010077  175302                  MOV     R0,@ML.REG+150          ; TMP.E1,*              2727
3758 020252  142777  000077  175304          BICB    #77,@ML.REG+160         ;                       2729
3759 020260  000207                          RTS     PC                      ;                       2651
3760
3761                                ; Routine Size:  21 words
```

```
                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
                                ;
                                ; Maximum stack depth per invocation:  0 words
                                ;
                                ;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (12)

;          2733  routine FIRST_BLK_XFER : novalue =
;          2734
;          2735  !++
;          2736  ! FUNCTIONAL DESCRIPTION:
;          2737  !       A REPEATEDLY CALLED SEQUENCE OF
;          2738  !       ASSIGNMENT EXPRESSION TO LOAD
;          2739  !       THE DSA, BUS ADRS AND WORD COUNT
;          2740  !       REGISTERS WITH APPROPRIATE INFORMATION
;          2741  !       BEFORE MASS BUS TRANSFERS CAN
;          2742  !       COMMENCE.
;          2743  !
;          2744  !       LOADS A MASS_BUS BLOCK XFERR AT
;          2745  !       BLOCK ZERO.
;          2746  !
;          2747  !--
;          2748
;          2749      begin
;          2750      ECC_DIS = ONE;                    !DISABLE ERROR CORRECTION
;          2751      MLDA = ZEROES;                    !LOAD THE DSA REG WITH SECTOR ZERO
;          2752      MLBA = IO_BUF;                    !LOAD THE BUS ADDRESS REG WITH IO_BUF ADRS
;          2753      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2754      end;

                                        .SBTTL  FIRST.BLK.XFER ROUTINE DECLARATION SECTION
020262                          FIRST.BLK.XFER:
020262  152777  000002  175234          BISB    #2,@ML.REG+120          ;                       2750
020270  005077  175140                  CLR     @ML.REG+30              ;                       2751
020274  012777  014022  175122          MOV     #IO.BUF,@ML.REG+20      ;                       2752
020302  012777  177400  175104          MOV     #-400,@ML.REG+10        ;                       2753
020310  000207                          RTS     PC                      ;                       2733

                                ; Routine Size:  12 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (13)

;          2755  routine GD_BLK_XFER : novalue =

;          2756
;          2757  !++
;          2758  ! FUNCTIONAL DESCRIPTION:
;          2759  !       A REPEATEDLY CALLED SEQUENCE OF
;          2760  !       ASSIGNMENT EXPRESSIONS TO LOAD
;          2761  !       THE DSA, BUS ADRS AND WORD
;          2762  !       COUNT REGISTERS WITH APPROPRIATE
;          2763  !       INFORMATION BEFORE A MASS BUS
;          2764  !       TRANSFERS CAN COMMENCE
;          2765  !
;          2766  !       LOADS A MASS BUS BLOCK XFERR
;          2767  !       AT THE GOOD BLOCK ADRS FOUND
;          2768  !       BY THE READ WRITE ARRAYS WITH
;          2769  !       PROM DATA TEST
;          2770  !
;          2771  !--
;          2772
;          2773      begin
;          2774      ECC_DIS = ONE;                    !DISABLE ERROR CORRECTION
;          2775      MLDA = .GOOD_BLK;                 !LOAD DSA REG WITH THE GOOD BLOCK ADRS
;          2776      MLBA = IO_BUF;                    !LOAD BUS ADRS REG WITH IO_BUF ADRS
;          2777      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2778      end;

                                        .SBTTL  GD.BLK.XFER ROUTINE DECLARATION SECTION
020312                          GD.BLK.XFER:
020312  152777  000002  175204            BISB    #2,@ML.REG+120          ;                       2774
020320  016777  173462  175106            MOV     GOOD.BLK,@ML.REG+30     ;                       2775
020326  012777  014022  175070            MOV     #IO.BUF,@ML.REG+20      ;                       2776
020334  012777  177400  175052            MOV     #-400,@ML.REG+10        ;                       2777
020342  000207                            RTS     PC                      ;                       2755

                                ; Routine Size:  13 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (14)

;          2779  routine LAST_BLK_XFER : novalue =
;          2780
;          2781  !++
;          2782  ! FUNCTIONAL DESCRIPTION:
;          2783  !       A REPEATEDLY CALLED SEQUENCE OF
;          2784  !       ASSIGNMENT EXPRESSIONS TO LOAD
;          2785  !       THE DSA, BUS ADRS AND WORD
;          2786  !       COUNT REGISTERS WITH APPROPRIATE
;          2787  !       INFORMATION BEFORE A MBUS
;          2788  !       TRANSFER CAN COMMENCE
;          2789  !
;          2790  !       LOADS A MASS BUS BLOCK
;          2791  !       TRANSFER AT THE LAST BLOCK
;          2792  !       ADDRESS
;          2793  !
;          2794  !--
;          2795
;          2796      begin
;          2797      ECC_DIS = ONE;                       !DISABLE ERROR CORRECTION
;          2798      MLDA = .LST_BLK;                     !LOAD DSA REG WITH THE LAST BLOCK ADRS
;          2799      MLBA = IO_BUF;                       !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
;          2800      MLWC = not 255;                      !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2801      end;

                                        .SBTTL  LAST.BLK.XFER ROUTINE DECLARATION SECTION
020344                          LAST.BLK.XFER:
020344  152777  000002  175152            BISB    #2,@ML.REG+120          ;                       2797
020352  016777  173436  175054            MOV     LST.BLK,@ML.REG+30      ;                       2798
020360  012777  014022  175036            MOV     #IO.BUF,@ML.REG+20      ;                       2799
020366  012777  177400  175020            MOV     #-400,@ML.REG+10        ;                       2800
020374  000207                            RTS     PC                      ;                       2779

                                ; Routine Size:  13 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (15)

;          2802  routine TST_LNG_WRD (NIB_NUM, NIB_PAT, ERR_FLG) : novalue =
;          2803      begin
;          2804
;          2805  !++
;          2806  ! FUNCTIONAL DESCRIPTION:
;          2807  !       COMPARES THE CURRENT NIBBLE
;          2808  !       POSITION IN 'NIB_SAVE' WITH THE
;          2809  !       CURRENT TEST PATTERN.  IF THE
;          2810  !       TWO VALUES ARE NOT EQUAL AN
;          2811  !       ERROR FLG IS SET WHICH THE
;          2812  !       CALLER CAN INTERIGATE
;          2813  !
;          2814  ! FORMAL PARAMETERS:
;          2815  !       NIB_NUM
;          2816  !       CASE SELECT EXPRESSION TO SELECT THE
;          2817  !       CURRENT NIBBLE TO BE EXAMINED
;          2818  !
;          2819  !       NIB_PAT
;          2820  !       CURRENT NIBBLE PATTERN TO BE
;          2821  !       COMPARED
;          2822  !
;          2823  !       ERR_FLG
;          2824  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          2825  !       OF THE CALLERS ERROR FLG
;          2826  !       TO ENABLE THE CALLER TO EXAMINE
;          2827  !       THE ERROR STATUS OF THE ROUTINE CALL
;          2828  !
;          2829  ! IMPLICIT INPUTS:
;          2830  !       NIB_SAVE
;          2831  !       BLOCK OF 3 WORDS TO STORE
;          2832  !       THE DATA FOUND IN MLD1, MLD2
;          2833  !       AND MLE2 AFTER A DIAGNOSTIC MODE
;          2834  !       READ
;          2835  !
;          2836  ! IMPLICIT OUTPUTS:     NONE
;          2837  !--
;          2838
;          2839      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG BACK IN THE CALLING ROUTINE
;          2840
;          2841      case .(NIB_NUM) from 0 to 9 of            !SELECT THE NIBBLE TO BE TESTED
;          2842          set
;          2843
;          2844          [0] :
;          2845
;          2846              if .NIB_SAVE [NIB_0] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2847
;          2848                                                !TEST NIBBLE 0 AND SET ERR FLG IF NEQ
;          2849
;          2850          [1] :
;          2851
;          2852              if .NIB_SAVE [NIB_1] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2853
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (15)

;          2854                                         !TEST NIBBLE 1 AND SET ERR FLG IF NEQ
;          2855
;          2856          [2] :
;          2857
;          2858              if .NIB_SAVE [NIB_2] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2859                                         !TEST NIBBLE 2 AND SET ERR FLG IF NEQ
;          2860
;          2861          [3] :
;          2862
;          2863              if .NIB_SAVE [NIB_3] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2864                                         !TEST NIBBLE 3 AND SET ERR FLG IF NEQ
;          2865
;          2866          [4] :
;          2867
;          2868              if .NIB_SAVE [NIB_4] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2869                                         !TEST NIBBLE 4 AND SET ERR FLG IF NEQ
;          2870
;          2871          [5] :
;          2872
;          2873              if .NIB_SAVE [NIB_5] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2874                                         !TEST NIBBLE 5 AND SET ERR FLG IF NEQ
;          2875
;          2876          [6] :
;          2877
;          2878              if .NIB_SAVE [NIB_6] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2879                                         !TEST NIBBLE 6 AND SET ERR FLG IF NEQ
;          2880
;          2881          [7] :
;          2882
;          2883              if .NIB_SAVE [NIB_7] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2884                                         !TEST NIBBLE 7 AND SET ERR FLG IF NEQ
;          2885
;          2886          [8] :
;          2887
;          2888              if .NIB_SAVE [NIB_8] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2889                                         !TEST NIBBLE 8 AND SET ERR FLG IF NEQ
;          2890
;          2891          [9] :
;          2892
;          2893              if .NIB_SAVE [NIB_9] neq .(NIB_PAT)<0, 3>
;          2894              then
;          2895                  .ERR_FLG = ONE          !TEST NIBBLE 9 AND SET ERR FLG IF NEQ
;          2896          tes;
;          2897
;          2898      end;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (15)


                                        .SBTTL  TST.LNG.WRD ROUTINE DECLARATION SECTION
020376                          TST.LNG.WRD:
020376  004167  164136                  JSR     R1,$SAVE2                       ;                                2802
020402  016600  000010                  MOV     10(SP),R0                       ; ERR.FLG,*                      2839
020406  005010                          CLR     (R0)
020410  016601  000014                  MOV     14(SP),R1                       ; NIB.NUM,*                      2841
020414  006301                          ASL     R1
020416  066107  020422                  ADD     1$(R1),PC
020422  000024                  1$:     .WORD   2$-1$
020424  000052                          .WORD   3$-1$
020426  000110                          .WORD   4$-1$
020430  000140                          .WORD   5$-1$
020432  000200                          .WORD   6$-1$
020434  000226                          .WORD   7$-1$
020436  000264                          .WORD   8$-1$
020440  000314                          .WORD   9$-1$
020442  000354                          .WORD   10$-1$
020444  000404                          .WORD   11$-1$
020446  016602  000012          2$:     MOV     12(SP),R2                       ; NIB.PAT,*                      2846
020452  042702  177760                  BIC     #177760,R2
020456  016701  172712                  MOV     NIB.SAVE,R1
020462  042701  177760                  BIC     #177760,R1
020466  020102                          CMP     R1,R2
020470  001577                          BEQ     13$
020472  000574                          BR      12$
020474  016601  000012          3$:     MOV     12(SP),R1                       ; NIB.PAT,*                      2852
020500  042701  177760                  BIC     #177760,R1
020504  016702  172664                  MOV     NIB.SAVE,R2
020510  006202                          ASR     R2
020512  006202                          ASR     R2
020514  006202                          ASR     R2
020516  006202                          ASR     R2
020520  042702  177760                  BIC     #177760,R2
020524  020201                          CMP     R2,R1
020526  001560                          BEQ     13$
020530  000555                          BR      12$
020532  016601  000012          4$:     MOV     12(SP),R1                       ; NIB.PAT,*                      2858
020536  042701  177760                  BIC     #177760,R1
020542  016702  172626                  MOV     NIB.SAVE,R2
020546  000302                          SWAB    R2
020550  042702  177760                  BIC     #177760,R2
020554  020201                          CMP     R2,R1
020556  001544                          BEQ     13$
020560  000541                          BR      12$
020562  016601  000012          5$:     MOV     12(SP),R1                       ; NIB.PAT,*                      2864
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

020566  042701  177760                          BIC     #177760,R1
020572  016702  172576                          MOV     NIB.SAVE,R2
020576  006202                                  ASR     R2
020600  006202                                  ASR     R2
020602  006202                                  ASR     R2
020604  006202                                  ASR     R2
020606  000302                                  SWAB    R2
020610  042702  177760                          BIC     #177760,R2
020614  020201                                  CMP     R2,R1
020616  001524                                  BEQ     13$
020620  000521                                  BR      12$
020622  016601  000012                  6$:     MOV     12(SP),R1                       ; NIB.PAT,*                     2870
020626  042701  177760                          BIC     #177760,R1
020632  016702  172540                          MOV     NIB.SAVE+2,R2
020636  042702  177760                          BIC     #177760,R2
020642  020201                                  CMP     R2,R1
020644  001511                                  BEQ     13$
020646  000506                                  BR      12$
020650  016601  000012                  7$:     MOV     12(SP),R1                       ; NIB.PAT,*                     2876
020654  042701  177760                          BIC     #177760,R1
020660  016702  172512                          MOV     NIB.SAVE+2,R2
020664  006202                                  ASR     R2
020666  006202                                  ASR     R2
020670  006202                                  ASR     R2
020672  006202                                  ASR     R2
020674  042702  177760                          BIC     #177760,R2
020700  020201                                  CMP     R2,R1
020702  001472                                  BEQ     13$
020704  000467                                  BR      12$
020706  016601  000012                  8$:     MOV     12(SP),R1                       ; NIB.PAT,*                     2882
020712  042701  177760                          BIC     #177760,R1
020716  016702  172454                          MOV     NIB.SAVE+2,R2
020722  000302                                  SWAB    R2
020724  042702  177760                          BIC     #177760,R2
020730  020201                                  CMP     R2,R1
020732  001456                                  BEQ     13$
020734  000453                                  BR      12$
020736  016601  000012                  9$:     MOV     12(SP),R1                       ; NIB.PAT,*                     2888
020742  042701  177760                          BIC     #177760,R1
020746  016702  172424                          MOV     NIB.SAVE+2,R2
020752  006202                                  ASR     R2
020754  006202                                  ASR     R2
020756  006202                                  ASR     R2
020760  006202                                  ASR     R2
020762  000302                                  SWAB    R2
020764  042702  177760                          BIC     #177760,R2
020770  020201                                  CMP     R2,R1
020772  001436                                  BEQ     13$
020774  000433                                  BR      12$
020776  016601  000012                  10$:    MOV     12(SP),R1                       ; NIB.PAT,*                     2894
021002  042701  177760                          BIC     #177760,R1
021006  016702  172366                          MOV     NIB.SAVE+4,R2
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

021012  000302                                  SWAB    R2
021014  042702  177760                          BIC     #177760,R2
021020  020201                                  CMP     R2,R1
021022  001422                                  BEQ     13$
021024  000417                                  BR      12$
021026  016601  000012                  11$:    MOV     12(SP),R1                       ; NIB.PAT,*                     2900
021032  042701  177770                          BIC     #177770,R1
021036  016702  172336                          MOV     NIB.SAVE+4,R2
021042  006202                                  ASR     R2
021044  006202                                  ASR     R2
021046  006202                                  ASR     R2
021050  006202                                  ASR     R2
021052  000302                                  SWAB    R2
021054  042702  177770                          BIC     #177770,R2
021060  020201                                  CMP     R2,R1
021062  001402                                  BEQ     13$
021064  012710  000001                  12$:    MOV     #1,(R0)                         ;                               2902
021070  000207                          13$:    RTS     PC                              ;                               2802

                                        ; Routine Size:  158 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (16)

;          2906  routine XOR_LNG_WRD (NIB_NUM, NIB_PAT, RESULT) : novalue =
;          2907      begin
;          2908
;          2909  !++
;          2910  ! FUNCTIONAL DESCRIPTION:
;          2911  !       EXCLUSIVE ORS THE CURRENT
;          2912  !       NIBBLE POSITION IN 'NIB_SAVE'
;          2913  !       WITH THE CURRENT TEST PATTERN
;          2914  !       AND ASSIGNS THE RESULTS TO THE
;          2915  !       FORMAL PARAMETER 'RESULT'.
;          2916  !
;          2917  ! FORMAL PARAMETERS:
;          2918  !       NIB_NUM
;          2919  !       CASE SELECT EXPRESSION TO
;          2920  !       SELECT THE CURRENT NIBBLE TO BE
;          2921  !        EXAMINED
;          2922  !
;          2923  !       NIB_PAT
;          2924  !       CURRENT NIBBLE PATTERN TO BE
;          2925  !       XOR'ED
;          2926  !
;          2927  !       RESULT
;          2928  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          2929  !       OF AN OWN STORAGE LOCATION TO
;          2930  !       ENABLE THE CALLER TO EXAMINE THE XOR RESULTS.
;          2931  !
;          2932  ! IMPLICIT INPUTS:
;          2933  !       NIB_SAVE
;          2934  !       BLOCK OF 3 WORDS TO STORE
;          2935  !       THE DATA FOUND IN MLD1
;          2936  !       MLD2 AND MLE2 AFTER A
;          2937  !       DIAGNOSTIC MODE READ.
;          2938  !
;          2939  ! IMPLICIT OUTPUTS:    NONE
;          2940  !--
;          2941
;          2942      case .(NIB_NUM) from 0 to 9 of              !SELECT THE NIBBLE TO BE XOR'ED
;          2943          set
;          2944
;          2945          [0] :
;          2946              .RESULT = .NIB_SAVE [NIB_0] xor .NIB_PAT;
;          2947                                                  !XOR NIBBLE 0 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2948
;          2949          [1] :
;          2950              .RESULT = .NIB_SAVE [NIB_1] xor .NIB_PAT;
;          2951                                                  !XOR NIBBLE 1 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2952
;          2953          [2] :
;          2954              .RESULT = .NIB_SAVE [NIB_2] xor .NIB_PAT;
;          2955                                                  !XOR NIBBLE 2 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2956
;          2957          [3] :
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (16)

;                2958            .RESULT = .NIB_SAVE [NIB_3] xor .NIB_PAT;
;                2959                                      !XOR NIBBLE 3 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2960
;                2961        [4] :
;                2962            .RESULT = .NIB_SAVE [NIB_4] xor .NIB_PAT;
;                2963                                      !XOR NIBBLE 4 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2964
;                2965        [5] :
;                2966            .RESULT = .NIB_SAVE [NIB_5] xor .NIB_PAT;
;                2967                                      !XOR NIBBLE 5 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2968
;                2969        [6] :
;                2970            .RESULT = .NIB_SAVE [NIB_6] xor .NIB_PAT;
;                2971                                      !XOR NIBBLE 6 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2972
;                2973        [7] :
;                2974            .RESULT = .NIB_SAVE [NIB_7] xor .NIB_PAT;
;                2975                                      !XOR NIBBLE 7 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2976
;                2977        [8] :
;                2978            .RESULT = .NIB_SAVE [NIB_8] xor .NIB_PAT;
;                2979                                      !XOR NIBBLE 8 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2980
;                2981        [9] :
;                2982            .RESULT = .NIB_SAVE [NIB_9] xor .NIB_PAT
;                2983                                      !XOR NIBBLE 9 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2984            tes;
;                2985
;                2986    end;
;
                                        .SBTTL  XOR.LNG.WRD ROUTINE DECLARATION SECTION
021072                          XOR.LNG.WRD:
021072  004167  163474                JSR     R1,$SAVE4                       ;                                       2906
021076  016601  000016                MOV     16(SP),R1                       ; NIB.PAT,*                             2946
021102  016602  000014                MOV     14(SP),R2                       ; RESULT,*
021106  016600  000020                MOV     20(SP),R0                       ; NIB.NUM,*                             2942
021112  006300                        ASL     R0
021114  066007  021120                ADD     1$(R0),PC
021120  000024                1$:     .WORD   2$-1$
021122  000036                        .WORD   3$-1$
021124  000062                        .WORD   4$-1$
021126  000070                        .WORD   5$-1$
021130  000076                        .WORD   6$-1$
021132  000120                        .WORD   8$-1$
021134  000136                        .WORD   9$-1$
021136  000144                        .WORD   10$-1$
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

021140  000162                                  .WORD   12$-1$
021142  000176                                  .WORD   15$-1$
021144  016712  172224                  2$:     MOV     NIB.SAVE,(R2)                   ;                                2946
021150  042712  177760                          BIC     #177760,(R2)
021154  000472                                  BR      17$
021156  016703  172212                  3$:     MOV     NIB.SAVE,R3                     ;                                2950
021162  006203                                  ASR     R3
021164  006203                                  ASR     R3
021166  006203                                  ASR     R3
021170  006203                                  ASR     R3
021172  042703  177760                          BIC     #177760,R3
021176  010312                                  MOV     R3,(R2)
021200  000412                                  BR      7$
021202  016704  172166                  4$:     MOV     NIB.SAVE,R4                     ;                                2954
021206  000437                                  BR      13$
021210  016704  172160                  5$:     MOV     NIB.SAVE,R4                     ;                                2958
021214  000425                                  BR      11$
021216  016712  172154                  6$:     MOV     NIB.SAVE+2,(R2)                 ;                                2962
021222  042712  177760                          BIC     #177760,(R2)
021226  010104                          7$:     MOV     R1,R4
021230  041204                                  BIC     (R2),R4
021232  040112                                  BIC     R1,(R2)
021234  050412                                  BIS     R4,(R2)
021236  000207                                  RTS     PC                              ;                                2942
021240  016704  172132                  8$:     MOV     NIB.SAVE+2,R4                   ;                                2966
021244  006204                                  ASR     R4
021246  006204                                  ASR     R4
021250  006204                                  ASR     R4
021252  006204                                  ASR     R4
021254  000415                                  BR      14$
021256  016704  172114                  9$:     MOV     NIB.SAVE+2,R4                   ;                                2970
021262  000411                                  BR      13$
021264  016704  172106                  10$:    MOV     NIB.SAVE+2,R4                   ;                                2974
021270  006204                          11$:    ASR     R4
021272  006204                                  ASR     R4
021274  006204                                  ASR     R4
021276  006204                                  ASR     R4
021300  000402                                  BR      13$
021302  016704  172072                  12$:    MOV     NIB.SAVE+4,R4                   ;                                2978
021306  000304                          13$:    SWAB    R4
021310  042704  177760                  14$:    BIC     #177760,R4
021314  000411                                  BR      16$
021316  016704  172056                  15$:    MOV     NIB.SAVE+4,R4                   ;                                2982
021322  006204                                  ASR     R4
021324  006204                                  ASR     R4
021326  006204                                  ASR     R4
021330  006204                                  ASR     R4
021332  000304                                  SWAB    R4
021334  042704  177770                          BIC     #177770,R4
021340  010412                          16$:    MOV     R4,(R2)
021342  010103                          17$:    MOV     R1,R3
021344  041203                                  BIC     (R2),R3
```

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                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<

021346  040112                        BIC     R1,(R2)
021350  050312                        BIS     R3,(R2)
021352  000207                        RTS     PC                      ;               2906

                                ; Routine Size:  89 words
                                ; Maximum stack depth per invocation:  5 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (17)

;          2987  routine LD_LNG_WRD (NIB_NUM, NIB_PAT) : novalue =
;          2988      begin
;          2989
;          2990  !++
;          2991  ! FUNCTIONAL DESCRIPTION:
;          2992  !       LOADS 'NIB_SAVE' WITH UNIQUE
;          2993  !       NIBBLE PATTERNS PRIOR TO WRITING
;          2994  !       TO MLD1, MLD2 AND MLE2
;          2995  !       DATA DIAGNOSTIC REGISTERS.
;          2996  !
;          2997  ! FORMAL PARAMETERS:
;          2998  !       NIB_NUM
;          2999  !       CASE SELECT EXPRESSION TO SELECT
;          3000  !       THE CURRENT NIBBLE TO BE LOADED
;          3001  !
;          3002  !       NIB_PAT
;          3003  !       CURRENT NIBBLE PATTERN TO BE
;          3004  !       LOADED
;          3005  !
;          3006  ! IMPLICIT INPUTS:
;          3007  !       NIB_SAVE
;          3008  !       BLOCK OF 3 WORDS TO STORE
;          3009  !       THE DATA TO BE WRITTEN
;          3010  !       INTO MLD1 MLD2 MLE2
;          3011  !
;          3012  ! IMPLICIT OUTPUTS:
;          3013  !       NIB_SAVE IS LOADED WIH
;          3014  !       THE CURRENT NIBBLE PATTERN
;          3015  !--
;          3016
;          3017      case .(NIB_NUM) from 0 to 9 of          !SELECT THE NIBBLE LOCATION IN NIB_SAVE TO BE LOADED
;          3018          set
;          3019
;          3020          [0] :
;          3021              NIB_SAVE [NIB_0] = .NIB_PAT;    !LOAD NIBBLE 0 WITH NIB_PAT
;          3022
;          3023          [1] :
;          3024              NIB_SAVE [NIB_1] = .NIB_PAT;    !LOAD NIBBLE 1 WITH NIB_PAT
;          3025
;          3026          [2] :
;          3027              NIB_SAVE [NIB_2] = .NIB_PAT;    !LOAD NIBBLE 2 WITH NIB_PAT
;          3028
;          3029          [3] :
;          3030              NIB_SAVE [NIB_3] = .NIB_PAT;    !LOAD NIBBLE 3 WITH NIB_PAT
;          3031
;          3032          [4] :
;          3033              NIB_SAVE [NIB_4] = .NIB_PAT;    !LOAD NIBBLE 4 WITH NIB_PAT
;          3034
;          3035          [5] :
;          3036              NIB_SAVE [NIB_5] = .NIB_PAT;    !LOAD NIBBLE 5 WITH NIB_PAT
;          3037
;          3038          [6] :
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (17)

;          3039              NIB_SAVE [NIB_6] = .NIB_PAT;        !LOAD NIBBLE 6 WITH NIB_PAT
;          3040
;          3041          [7] :
;          3042              NIB_SAVE [NIB_7] = .NIB_PAT;        !LOAD NIBBLE 7 WITH NIB_PAT
;          3043
;          3044          [8] :
;          3045              NIB_SAVE [NIB_8] = .NIB_PAT;        !LOAD NIBBLE 8 WITH NIB_PAT
;          3046
;          3047          [9] :
;          3048              NIB_SAVE [NIB_9] = .NIB_PAT         !LOAD NIBBLE 9 WITH NIB_PAT
;          3049          tes;
;          3050
;          3051      end;

                                        .SBTTL  LD.LNG.WRD ROUTINE DECLARATION SECTION
021354                          LD.LNG.WRD:
021354  010146                          MOV     R1,-(SP)                ;                               2987
021356  016600  000004                  MOV     4(SP),R0                ; NIB.PAT,*                     3021
021362  016601  000006                  MOV     6(SP),R1                ; NIB.NUM,*                     3017
021366  006301                          ASL     R1
021370  066107  021374                  ADD     1$(R1),PC
021374  000024                  1$:     .WORD   2$-1$
021376  000040                          .WORD   3$-1$
021400  000064                          .WORD   4$-1$
021402  000102                          .WORD   5$-1$
021404  000134                          .WORD   7$-1$
021406  000150                          .WORD   8$-1$
021410  000174                          .WORD   9$-1$
021412  000212                          .WORD   10$-1$
021414  000244                          .WORD   12$-1$
021416  000262                          .WORD   13$-1$
021420  042700  177760          2$:     BIC     #177760,R0              ;                               3021
021424  142767  000017  171742          BICB    #17,NIB.SAVE
021432  000433                          BR      6$
021434  006300                  3$:     ASL     R0                      ;                               3024
021436  006300                          ASL     R0
021440  006300                          ASL     R0
021442  006300                          ASL     R0
021444  042700  177417                  BIC     #177417,R0
021450  142767  000360  171716          BICB    #360,NIB.SAVE
021456  000421                          BR      6$
021460  000300                  4$:     SWAB    R0                      ;                               3027
021462  042700  170377                  BIC     #170377,R0
021466  042767  007400  171700          BIC     #7400,NIB.SAVE
021474  000412                          BR      6$
021476  000300                  5$:     SWAB    R0                      ;                               3030
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

021500  006300                                  ASL     R0
021502  006300                                  ASL     R0
021504  006300                                  ASL     R0
021506  006300                                  ASL     R0
021510  042700  007777                          BIC     #7777,R0
021514  042767  170000  171652                  BIC     #170000,NIB.SAVE
021522  050067  171646                  6$:     BIS     R0,NIB.SAVE
021526  000467                                  BR      15$                     ;                       3017
021530  042700  177760                  7$:     BIC     #177760,R0              ;                       3033
021534  142767  000017  171634                  BICB    #17,NIB.SAVE+2
021542  000433                                  BR      11$
021544  006300                          8$:     ASL     R0                      ;                       3036
021546  006300                                  ASL     R0
021550  006300                                  ASL     R0
021552  006300                                  ASL     R0
021554  042700  177417                          BIC     #177417,R0
021560  142767  000360  171610                  BICB    #360,NIB.SAVE+2
021566  000421                                  BR      11$
021570  000300                          9$:     SWAB    R0                      ;                       3039
021572  042700  170377                          BIC     #170377,R0
021576  042767  007400  171572                  BIC     #7400,NIB.SAVE+2
021604  000412                                  BR      11$
021606  000300                          10$:    SWAB    R0                      ;                       3042
021610  006300                                  ASL     R0
021612  006300                                  ASL     R0
021614  006300                                  ASL     R0
021616  006300                                  ASL     R0
021620  042700  007777                          BIC     #7777,R0
021624  042767  170000  171544                  BIC     #170000,NIB.SAVE+2
021632  050067  171540                  11$:    BIS     R0,NIB.SAVE+2
021636  000423                                  BR      15$                     ;                       3017
021640  000300                          12$:    SWAB    R0                      ;                       3045
021642  042700  170377                          BIC     #170377,R0
021646  042767  007400  171524                  BIC     #7400,NIB.SAVE+4
021654  000412                                  BR      14$
021656  000300                          13$:    SWAB    R0                      ;                       3048
021660  006300                                  ASL     R0
021662  006300                                  ASL     R0
021664  006300                                  ASL     R0
021666  006300                                  ASL     R0
021670  042700  107777                          BIC     #107777,R0
021674  042767  070000  171476                  BIC     #70000,NIB.SAVE+4
021702  050067  171472                  14$:    BIS     R0,NIB.SAVE+4
021706  012601                          15$:    MOV     (SP)+,R1                ;                       2987
021710  000207                                  RTS     PC

                                        ; Routine Size:  111 words
                                        ; Maximum stack depth per invocation:  2 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (18)

;          3052  routine WRT_CS1 (TST_PAT, index) : novalue =
;          3053      begin
;          3054
;          3055  !++
;          3056  ! FUNCTIONAL DESCRIPTION:
;          3057  !
;          3058  !       LOADS THE CONTROL & STATUS REGISTER 1 WITH A DATA PATTERN
;          3059  !       GENERATED BY THE MACRO WRT_MASK.
;          3060  !
;          3061  ! FORMAL PARAMETERS:
;          3062  !       TST_PAT
;          3063  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3064  !
;          3065  !       INDEX
;          3066  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3067  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3068  !
;          3069  !--
;          3070
;          3071      MLCS1 = WRT_MASK;                       !LOAD GENERATED WRT_MASK PATTERN INTO MLCS1
;          3072      end;
4558
4559                                    .SBTTL  WRT.CS1 ROUTINE DECLARATION SECTION
4563 021712  004167  162622        WRT.CS1:JSR     R1,$SAVE2                       ;                       3052
4564 021716  016600  000010                MOV     10(SP),R0                       ; INDEX,*               3071
4565 021722  006300                        ASL     R0
4566 021724  006300                        ASL     R0
4567 021726  006300                        ASL     R0
4568 021730  010001                        MOV     R0,R1
4569 021732  016100  015406                MOV     ML.REG+2(R1),R0
4570 021736  056600  000012                BIS     12(SP),R0                       ; TST.PAT,*
4571 021742  046100  015410                BIC     ML.REG+4(R1),R0
4572 021746  016102  015412                MOV     ML.REG+6(R1),R2
4573 021752  050002                        BIS     R0,R2
4574 021754  010277  173424                MOV     R2,@ML.REG
4575 021760  000207                        RTS     PC                              ;                       3052
4576
4577                                    ; Routine Size:  20 words
4578                                    ; Maximum stack depth per invocation:  3 words
4583
4584
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (19)

routine RD_CS1 (TST_PAT, index, ERR_FLG) : novalue =
    begin

!++
! FUNCTIONAL DESCRIPTION:
!
!       COMPARES THE CONTENTS OF THE
!       CONTROL & STATUS REGISTER 1
!       WITH THE MASKED DATA PATTERN
!       GENERATED BY THE MACRO 'WRT_MASK'
!
!       IF THE COMPARE IS NOT EQUAL THEN
!       THE FORMAL PARAMETER 'ERR_FLG' IS
!       ASSIGNED A ONE TO INDICATE THE
!       ERROR.
!
! FORMAL PARAMETERS:
!
!       TST_PAT
!       DATA PATTERN TO BE MASKED AND
!       COMPARED AGAINST THE CONTENTS
!       OF THE REGISTER UNDER TEST.
!
!       INDEX
!        USED BY THE MACRO WRT_MASK TO
!       SELECT THE CURRENT REGISTERS ADDRESS,
!       FORCED HI, FORCED LO AND DON'T CARE
!       MASK INFORMATION.
!
!       ERR_FLG
!       CONTAINS THE ADDRESS (PASSED BY REF)
!       OF THE CALLERS ERROR FLG TO ENABLE THE
!       CALLER TO EXAMINE THE ERROR STATUS
!       OF THE ROUTINE CALL.
!
! IMPLICIT INPUTS:
!       WT_DATA
!         GETS LOADED WITH THE GENERATED
!         WRT_MASK DATA PATTERN THUS ALLOWING
!         CALLER TO PRINT FAILING GOOD DATA.
!
!       RD_DATA
!         GETS LOADED WITH DATA READ FROM THE
!         REGISTER THUS ALLOWING CALLER
!         TO PRINT FAILING BAD DATA.
!
! IMPLICIT OUTPUTS:
!       GLOBAL LOCATION WR_DATA
!       AND RD_DATA LOADED WITH GOOD
!       AND BAD REGISTER DATA
!--
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (19)
;
;          3125      .ERR_FLG = ZERO;                   !CLEAR ERROR FLAG
;          3126      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3127      RD_DATA = .ML[CS1 or .IGNORE;      !READ AND SAVE THE REGISTER
;          3128
;          3129      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3130
;          3131                                         !SET ERROR FLAG IF NEQ
;          3132      end;
                                        .SBTTL  RD.CS1 ROUTINE DECLARATION SECTION
021762  004167  162552          RD.CS1: JSR     R1,$SAVE2                       ;                       3073
021766  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3125
021772  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3126
021776  006300                          ASL     R0
022000  006300                          ASL     R0
022002  006300                          ASL     R0
022004  010001                          MOV     R0,R1
022006  016100  015406                  MOV     ML.REG+2(R1),R0
022012  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022016  046100  015410                  BIC     ML.REG+4(R1),R0
022022  016102  015412                  MOV     ML.REG+6(R1),R2
022026  050002                          BIS     R0,R2
022030  010267  173314                  MOV     R2,WT.DATA
022034  017702  173344                  MOV     @ML.REG,R2                      ;                       3127
022040  056102  015412                  BIS     ML.REG+6(R1),R2
022044  010267  173302                  MOV     R2,RD.DATA
022050  026767  173274  173274          CMP     WT.DATA,RD.DATA                 ;                       3129
022056  001403                          BEQ     1$
022060  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
022066  000207                  1$:     RTS     PC                              ;                       3073

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (20)

;          3133  routine WRT_ER (TST_PAT, index) : novalue =
;          3134      begin
;          3135
;          3136  !++
;          3137  ! FUNCTIONAL DESCRIPTION:
;          3138  !
;          3139  !       LOADS THE ERROR REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3140  !
;          3141  ! FORMAL PARAMETERS:
;          3142  !
;          3143  !       TST_PAT
;          3144  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3145  !
;          3146  !       INDEX
;          3147  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3148  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3149  !--
;          3150
;          3151      MLER = WRT_MASK;                          !LOAD GENERATE WRT_MASK PATTERN INTO MLER
;          3152      end;

                                    .SBTTL  WRT.ER ROUTINE DECLARATION SECTION
022070  004167  162444        WRT.ER: JSR     R1,$SAVE2                       ;                       3133
022074  016600  000010                MOV     10(SP),R0                       ; INDEX,*               3151
022100  006300                        ASL     R0
022102  006300                        ASL     R0
022104  006300                        ASL     R0
022106  010001                        MOV     R0,R1
022110  016100  015406                MOV     ML.REG+2(R1),R0
022114  056600  000012                BIS     12(SP),R0                       ; TST.PAT,*
022120  046100  015410                BIC     ML.REG+4(R1),R0
022124  016102  015412                MOV     ML.REG+6(R1),R2
022130  050002                        BIS     R0,R2
022132  010277  173326                MOV     R2,@ML.REG+60
022136  000207                        RTS     PC                              ;                       3133

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (21)

3153  routine RD_ER (TST_PAT, index, ERR_FLG) : novalue =
3154      begin
3155
3156  !++
3157  ! FUNCTIONAL DESCRIPTION:
3158  !
3159  !       COMPARES THE CONTENTS OF THE
3160  !       ERROR REGISTER WITH
3161  !       THE MASKED DATA PATTERN
3162  !       GENERATED BY THE MACRO 'WRT_MASK'.
3163  !
3164  !       IF THE COMPARE IS NOT EQUAL THEN
3165  !       THE FORMAL PARAMETER 'ERR_FLG' IS
3166  !       ASSIGNED A ONE TO INDICATE THE
3167  !       ERROR.
3168  !
3169  ! FORMAL PARAMETERS:
3170  !
3171  !       TST_PAT
3172  !       DATA PATTERN TO BE MASKED AND
3173  !       COMPARED AGAINST THE CONTENTS
3174  !       OF THE REGISTER UNDER TEST.
3175  !
3176  !       INDEX
3177  !       USED BY THE MACRO WRT_MASK TO
3178  !       SELECT THE CURRENT REGISTERS ADDRESS,
3179  !       FORCED HI, FORCED LO AND DON'T CARE
3180  !       MASK INFORMATION.
3181  !
3182  !       ERR_FLG
3183  !       CONTAINS THE ADDRESS (PASSED BY REF)
3184  !       OF THE CALLERS ERROR FLG TO ENABLE THE
3185  !       CALLER TO EXAMINE THE ERROR STATUS
3186  !       OF THE ROUTINE CALL.
3187  !
3188  ! IMPLICIT INPUTS:
3189  !       WT_DATA
3190  !         GETS LOADED WITH THE GENERATED
3191  !         WRT_MASK DATA PATTERN THUS ALLOWING
3192  !         CALLER TO PRINT FAILING GOOD DATA.
3193  !
3194  !       RD_DATA
3195  !         GETS LOADED WITH DATA READ FROM THE
3196  !         REGISTER THUS ALLOWING CALLER
3197  !         TO PRINT FAILING BAD DATA.
3198  !
3199  ! IMPLICIT OUTPUTS:
3200  !       GLOBAL LOCATION WR_DATA
3201  !       AND RD_DATA LOADED WITH GOOD
3202  !       AND BAD REGISTER DATA
3203  !
3204  !--
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (21)

;          3205
;          3206      .ERR_FLG = ZERO;                                   !CLEAR THE ERROR FLAG
;          3207      WT_DATA = WRT_MASK;                                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3208      RD_DATA = .MLER or .IGNORE;                        !READ AND SAVE THE REGISTER
;          3209
;          3210      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;          3211
;          3212                                                         !SET ERROR FLAG IF NEQ
;          3213      end;

                                        .SBTTL  RD.ER ROUTINE DECLARATION SECTION
022140  004167  162374          RD.ER:  JSR     R1,$SAVE2                       ;                                   3153
022144  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                           3206
022150  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                           3207
022154  006300                          ASL     R0
022156  006300                          ASL     R0
022160  006300                          ASL     R0
022162  010001                          MOV     R0,R1
022164  016100  015406                  MOV     ML.REG+2(R1),R0
022170  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022174  046100  015410                  BIC     ML.REG+4(R1),R0
022200  016102  015412                  MOV     ML.REG+6(R1),R2
022204  050002                          BIS     R0,R2
022206  010267  173136                  MOV     R2,WT.DATA
022212  017702  173246                  MOV     @ML.REG+60,R2                   ;                                   3208
022216  056102  015412                  BIS     ML.REG+6(R1),R2
022222  010267  173124                  MOV     R2,RD.DATA
022226  026767  173116  173116          CMP     WT.DATA,RD.DATA                 ;                                   3210
022234  001403                          BEQ     1$
022236  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
022244  000207                  1$:     RTS     PC                              ;                                   3153

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (22)

;          3214  routine WRT_DA (TST_PAT, index) : novalue =
;          3215      begin
;          3216
;          3217  !++
;          3218  ! FUNCTIONAL DESCRIPTION:
;          3219  !
;          3220  !       LOADS THE DESIRED SECTOR WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3221  !
;          3222  ! FORMAL PARAMETERS:
;          3223  !
;          3224  !       TST_PAT
;          3225  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3226  !
;          3227  !       INDEX
;          3228  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3229  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3230  !--
;          3231
;          3232      MLDA = WRT_MASK;                          !LOAD MLDA WITH GENERATED WRT_MASK PATTERN
;          3233      end;

                                        .SBTTL  WRT.DA ROUTINE DECLARATION SECTION
022246  004167  162266          WRT.DA: JSR     R1,$SAVE2                       ;                       3214
022252  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3232
022256  006300                          ASL     R0
022260  006300                          ASL     R0
022262  006300                          ASL     R0
022264  010001                          MOV     R0,R1
022266  016100  015406                  MOV     ML.REG+2(R1),R0
022272  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
022276  046100  015410                  BIC     ML.REG+4(R1),R0
022302  016102  015412                  MOV     ML.REG+6(R1),R2
022306  050002                          BIS     R0,R2
022310  010277  173120                  MOV     R2,@ML.REG+30
022314  000207                          RTS     PC                              ;                       3214

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (23)

;          3234  routine RD_DA (TST_PAT, index, ERR_FLG) : novalue =
;          3235      begin
;          3236
;          3237  !++
;          3238  ! FUNCTIONAL DESCRIPTION:
;          3239  !
;          3240  !       COMPARES THE CONTENTS OF THE
;          3241  !       DESIRED SECTOR ADDRESS REGISTER
;          3242  !       WITH THE MASKED DATA PATTERN
;          3243  !       GENERATED BY THE MACRO 'WRT_MASK'
;          3244  !
;          3245  !       IF THE COMPARE IS NOT EQUAL THEN
;          3246  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          3247  !       ASSIGNED A ONE TO INDICATE THE
;          3248  !       ERROR
;          3249  !
;          3250  ! FORMAL PARAMETERS:
;          3251  !
;          3252  !       TST_PAT
;          3253  !       DATA PATTERN TO BE MASKED AND
;          3254  !       COMPARED AGAINST THE CONTENTS
;          3255  !       OF THE REGISTER UNDER TEST
;          3256  !
;          3257  !       INDEX
;          3258  !       USED BY THE MACRO WRT_MASK TO
;          3259  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3260  !       FORCED HI, FORCED LO AND DON'T CARE
;          3261  !       MASK INFORMATION
;          3262  !
;          3263  !       ERR_FLG
;          3264  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3265  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3266  !       CALLER TO EXAMINE THE ERROR STATUS
;          3267  !       OF THE ROUTINE CALL.
;          3268  ! IMPLICIT INPUTS:
;          3269  !       WT_DATA
;          3270  !         GETS LOADED WITH THE GENERATED
;          3271  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3272  !         CALLER TO PRINT FAILING GOOD DATA.
;          3273  !
;          3274  !       RD_DATA
;          3275  !         GETS LOADED WITH DATA READ FROM THE
;          3276  !         REGISTER THUS ALLOWING CALLER
;          3277  !         TO PRINT FAILING BAD DATA.
;          3278  !
;          3279  ! IMPLICIT OUTPUTS:
;          3280  !       GLOBAL LOCATION WR_DATA
;          3281  !       AND RD_DATA LOADED WITH GOOD
;          3282  !       AND BAD REGISTER DATA
;          3283  !
;          3284  !--
;          3285
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (23)
;
;          3286      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
;          3287      WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          3288      RD_DATA = .MLDA_r .IGNORE;                !READ AND SAVE THE REGISTER
;          3289
;          3290      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3291
;          3292                                                !SET ERROR FLAG IF NEQ
;          3293      end;
;
                                    .SBTTL  RD.DA ROUTINE DECLARATION SECTION
022316  004167  162216          RD.DA:  JSR     R1,$SAVE2                       ;                               3234
022322  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                       3286
022326  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                       3287
022332  006300                          ASL     R0
022334  006300                          ASL     R0
022336  006300                          ASL     R0
022340  010001                          MOV     R0,R1
022342  016100  015406                  MOV     ML.REG+2(R1),R0
022346  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022352  046100  015410                  BIC     ML.REG+4(R1),R0
022356  016102  015412                  MOV     ML.REG+6(R1),R2
022362  050002                          BIS     R0,R2
022364  010267  172760                  MOV     R2,WT.DATA
022370  017702  173040                  MOV     @ML.REG+30,R2                   ;                               3288
022374  056102  015412                  BIS     ML.REG+6(R1),R2
022400  010267  172746                  MOV     R2,RD.DATA
022404  026767  172740  172740          CMP     WT.DATA,RD.DATA                 ;                               3290
022412  001403                          BEQ     1$
022414  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
022422  000207                  1$:     RTS     PC                              ;                               3234

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (24)

;          3294  routine WRT_MR (TST_PAT, index) : novalue =
;          3295      begin
;          3296
;          3297  !++
;          3298  ! FUNCTIONAL DESCRIPTION:
;          3299  !
;          3300  !       LOADS THE MAINTENANCE REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3301  !
;          3302  ! FORMAL PARAMETERS:
;          3303  !
;          3304  !       TST_PAT
;          3305  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3306  !
;          3307  !       INDEX
;          3308  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3309  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3310  !--
;          3311
;          3312      MLMR = WRT_MASK;                                  !LOAD MLMR WITH GENERATED WRT_MASK PATTERN
;          3313      end;

                                        .SBTTL  WRT.MR ROUTINE DECLARATION SECTION
022424  004167  162110          WRT.MR: JSR     R1,$SAVE2                       ;                                   3294
022430  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                           3312
022434  006300                          ASL     R0
022436  006300                          ASL     R0
022440  006300                          ASL     R0
022442  010001                          MOV     R0,R1
022444  016100  015406                  MOV     ML.REG+2(R1),R0
022450  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
022454  046100  015410                  BIC     ML.REG+4(R1),R0
022460  016102  015412                  MOV     ML.REG+6(R1),R2
022464  050002                          BIS     R0,R2
022466  010277  173032                  MOV     R2,@ML.REG+120
022472  000207                          RTS     PC                              ;                                   3294

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

```
5064 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5065 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (25)
5066
5067 ;          3314  routine RD_MR (TST_PAT, index, ERR_FLG) : novalue =
5068 ;          3315      begin
5069 ;          3316
5070 ;          3317  !++
5071 ;          3318  ! FUNCTIONAL DESCRIPTION:
5072 ;          3319  !
5073 ;          3320  !       COMPARES THE CONTENTS OF THE
5074 ;          3321  !       MAINTENANCE REGISTER WITH THE
5075 ;          3322  !       MASKED DATA PATTERN
5076 ;          3323  !       GENERATED BY THE MACRO 'WRT_MASK'.
5077 ;          3324  !
5078 ;          3325  !       IF THE COMPARE IS NOT EQUAL THEN
5079 ;          3326  !       THE FORMAL PARAMETER 'ERR_FLG' IS
5080 ;          3327  !       ASSIGNED A ONE TO INDICATE THE
5081 ;          3328  !       ERROR.
5082 ;          3329  !
5083 ;          3330  ! FORMAL PARAMETERS:
5084 ;          3331  !
5085 ;          3332  !       TST_PAT
5086 ;          3333  !       DATA PATTERN TO BE MASKED AND
5087 ;          3334  !       COMPARED AGAINST THE CONTENTS
5088 ;          3335  !       OF THE REGISTER UNDER TEST.
5089 ;          3336  !
5090 ;          3337  !       INDEX
5091 ;          3338  !       USED BY THE MACRO WRT_MASK TO
5092 ;          3339  !       SELECT THE CURRENT REGISTERS ADDRESS,
5093 ;          3340  !       FORCED HI, FORCED LO AND DON'T CARE
5094 ;          3341  !       MASK INFORMATION.
5095 ;          3342  !
5096 ;          3343  !       ERR_FLG
5097 ;          3344  !       CONTAINS THE ADDRESS (PASSED BY REF)
5098 ;          3345  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5099 ;          3346  !       CALLER TO EXAMINE THE ERROR STATUS
5100 ;          3347  !       OF THE ROUTINE CALL.
5101 ;          3348  !
5102 ;          3349  ! IMPLICIT INPUTS:
5103 ;          3350  !       WT_DATA
5104 ;          3351  !         GETS LOADED WITH THE GENERATED
5105 ;          3352  !         WRT_MASK DATA PATTERN THUS ALLOWING
5106 ;          3353  !         CALLER TO PRINT FAILING GOOD DATA.
5107 ;          3354  !
5108 ;          3355  !       RD_DATA
5109 ;          3356  !         GETS LOADED WITH DATA READ FROM THE
5110 ;          3357  !         REGISTER THUS ALLOWING CALLER
5111 ;          3358  !         TO PRINT FAILING BAD DATA.
5112 ;          3359  !
5113 ;          3360  ! IMPLICIT OUTPUTS:
5114 ;          3361  !       GLOBAL LOCATION WR_DATA
5115 ;          3362  !       AND RD_DATA LOADED WITH GOOD
5116 ;          3363  !       AND BAD REGISTER DATA
5117 ;          3364  !
5118 ;          3365  !--
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (25)

;          3366
;          3367      .ERR_FLG = ZERO;                                   !CLEAR THE ERROR FLAG
;          3368      WT_DATA = WRT_MASK;                                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3369      RD_DATA = .MLMR or .IGNORE;                        !READ AND SAVE THE REGISTER
;          3370
;          3371      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;          3372
;          3373                                                         !SET ERROR FLAG IF NEQ
;          3374      end;

                                        .SBTTL  RD.MR ROUTINE DECLARATION SECTION
022474  004167  162040          RD.MR:  JSR     R1,$SAVE2                       ;                                  3314
022500  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                          3367
022504  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                          3368
022510  006300                          ASL     R0
022512  006300                          ASL     R0
022514  006300                          ASL     R0
022516  010001                          MOV     R0,R1
022520  016100  015406                  MOV     ML.REG+2(R1),R0
022524  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022530  046100  015410                  BIC     ML.REG+4(R1),R0
022534  016102  015412                  MOV     ML.REG+6(R1),R2
022540  050002                          BIS     R0,R2
022542  010267  172602                  MOV     R2,WT.DATA
022546  017702  172752                  MOV     @ML.REG+120,R2                  ;                                  3369
022552  056102  015412                  BIS     ML.REG+6(R1),R2
022556  010267  172570                  MOV     R2,RD.DATA
022562  026767  172562  172562          CMP     WT.DATA,RD.DATA                 ;                                  3371
022570  001403                          BEQ     1$
022572  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
022600  000207                  1$:     RTS     PC                              ;                                  3314

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (26)

;        3375  routine WRT_PA (TST_PAT, index) : novalue =
;        3376      begin
;        3377
;        3378  !++
;        3379  ! FUNCTIONAL DESCRIPTION:
;        3380  !       LOADS THE PROM ADDRESS REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;        3381  ! FORMAL PARAMETERS:
;        3382  !       TST_PAT
;        3383  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;        3384  !       INDEX
;        3385  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;        3386  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;        3387  !--
;        3388
;        3389      PROM_DIS = ONE;                                   !SET PROM DISABLE BIT
;        3390      MLPA = WRT_MASK;                                  !LOAD MLPA WITH GENERATED WRT_MASK PATTERN
;        3391      PROM_DIS = ZERO;                                  !CLEAR PROM DISABLE BIT
;        3392      end;

                                        .SBTTL  WRT.PA ROUTINE DECLARATION SECTION
022602  004167  161732          WRT.PA: JSR     R1,$SAVE2                       ;                                  3375
022606  152777  000040  172710          BISB    #40,@ML.REG+120                 ;                                  3389
022614  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                          3390
022620  006300                          ASL     R0
022622  006300                          ASL     R0
022624  006300                          ASL     R0
022626  010001                          MOV     R0,R1
022630  016100  015406                  MOV     ML.REG+2(R1),R0
022634  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
022640  046100  015410                  BIC     ML.REG+4(R1),R0
022644  016102  015412                  MOV     ML.REG+6(R1),R2
022650  050002                          BIS     R0,R2
022652  010277  172626                  MOV     R2,@ML.REG+100
022656  142777  000040  172640          BICB    #40,@ML.REG+120                 ;                                  3391
022664  000207                          RTS     PC                              ;                                  3375

                                ; Routine Size:  26 words
                                ; Maximum stack depth per invocation:  3 words
```

```
5224 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5225 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (27)
5226
5227 ;          3393  routine RD_PA (TST_PAT, index, ERR_FLG) : novalue =
5228 ;          3394      begin
5229 ;          3395
5230 ;          3396  !++
5231 ;          3397  ! FUNCTIONAL DESCRIPTION:
5232 ;          3398  !
5233 ;          3399  !       COMPARES THE CONTENTS OF THE
5234 ;          3400  !       PROM ADDRESS REGISTER
5235 ;          3401  !       WITH THE MASKED DATA PATTERN
5236 ;          3402  !       GENERATED BY THE MACRO 'WRT_MASK'.
5237 ;          3403  !
5238 ;          3404  !       IF THE COMPARE IS NOT EQUAL THEN
5239 ;          3405  !       THE FORMAL PARAMETER 'ERR_FLG' IS
5240 ;          3406  !       ASSIGNED A ONE TO INDICATE THE
5241 ;          3407  !       ERROR.
5242 ;          3408  !
5243 ;          3409  ! FORMAL PARAMETERS:
5244 ;          3410  !       TST_PAT
5245 ;          3411  !       DATA PATTERN TO BE MASKED AND
5246 ;          3412  !       COMPARED AGAINST THE CONTENTS
5247 ;          3413  !       OF THE REGISTER UNDER TEST.
5248 ;          3414  !
5249 ;          3415  !       INDEX
5250 ;          3416  !       USED BY THE MACRO WRT_MASK TO
5251 ;          3417  !       SELECT THE CURRENT REGISTERS ADDRESS,
5252 ;          3418  !       FORCED HI, FORCED LO AND DON'T CARE
5253 ;          3419  !       MASK INFORMATION.
5254 ;          3420  !
5255 ;          3421  !       ERR_FLG
5256 ;          3422  !       CONTAINS THE ADDRESS (PASSED BY REF)
5257 ;          3423  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5258 ;          3424  !       CALLER TO EXAMINE THE ERROR STATUS
5259 ;          3425  !       OF THE ROUTINE CALL.
5260 ;          3426  !
5261 ;          3427  ! IMPLICIT INPUTS:
5262 ;          3428  !       WT_DATA
5263 ;          3429  !         GETS LOADED WITH THE GENERATED
5264 ;          3430  !         WRT_MASK DATA PATTERN THUS ALLOWING
5265 ;          3431  !         CALLER TO PRINT FAILING GOOD DATA.
5266 ;          3432  !
5267 ;          3433  !       RD_DATA
5268 ;          3434  !         GETS LOADED WITH DATA READ FROM THE
5269 ;          3435  !         REGISTER THUS ALLOWING CALLER
5270 ;          3436  !         TO PRINT FAILING BAD DATA.
5271 ;          3437  !
5272 ;          3438  ! IMPLICIT OUTPUTS:
5273 ;          3439  !       GLOBAL LOCATION WR_DATA
5274 ;          3440  !       AND RD_DATA LOADED WITH GOOD
5275 ;          3441  !       AND BAD REGISTER DATA
5276 ;          3442  !
5277 ;          3443  !--
5278 ;          3444
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (27)

;          3445      .ERR_FLG = ZERO;                                    !CLEAR THE ERROR FLAG
;          3446      PROM_DIS = ONE;                                     !SET THE PROM DISABLE BIT
;          3447      WT_DATA = WRT_MASK;                                 !SAVE THE DATA WRITTEN TO THE REGISTER
;          3448      RD_DATA = .MLPA or .IGNORE;                         !READ AND SAVE THE REGISTER
;          3449
;          3450      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3451
;          3452      PROM_DIS = ZERO;                                    !SET ERROR IF NEQ
;          3453      end;                                                !CLEAR THE PROM DISABLE BIT

                                        .SBTTL  RD.PA ROUTINE DECLARATION SECTION
022666  004167  161646          RD.PA:  JSR     R1,$SAVE2                       ;                                   3393
022672  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                           3445
022676  152777  000040  172620          BISB    #40,@ML.REG+120                 ;                                   3446
022704  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                           3447
022710  006300                          ASL     R0
022712  006300                          ASL     R0
022714  006300                          ASL     R0
022716  010001                          MOV     R0,R1
022720  016100  015406                  MOV     ML.REG+2(R1),R0
022724  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022730  046100  015410                  BIC     ML.REG+4(R1),R0
022734  016102  015412                  MOV     ML.REG+6(R1),R2
022740  050002                          BIS     R0,R2
022742  010267  172402                  MOV     R2,WT.DATA
022746  017702  172532                  MOV     @ML.REG+100,R2                  ;                                   3448
022752  056102  015412                  BIS     ML.REG+6(R1),R2
022756  010267  172370                  MOV     R2,RD.DATA
022762  026767  172362  172362          CMP     WT.DATA,RD.DATA                 ;                                   3450
022770  001403                          BEQ     1$
022772  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
023000  142777  000040  172516  1$:     BICB    #40,@ML.REG+120                 ;                                   3452
023006  000207                          RTS     PC                              ;                                   3393

                                ; Routine Size:  41 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (28)

;          3454  routine WRT_E1 (TST_PAT, index) : novalue =
;          3455      begin
;          3456
;          3457  !++
;          3458  ! FUNCTIONAL DESCRIPTION:
;          3459  !       LOADS THE ECC CRC WORD REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3460  ! FORMAL PARAMETERS:
;          3461  !       TST_PAT
;          3462  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3463  !       INDEX
;          3464  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3465  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3466  !--
;          3467
;          3468      ECC_DM = ONE;                                   !SET ECC DIAG MODE
;          3469      MLE1 = WRT_MASK;                                !LOAD MLE1 WITH GENERATED WRT_MASK PATTERN
;          3470      ECC_DM = ZERO;                                  !CLEAR ECC DIAG MODE
;          3471      end;

                                        .SBTTL  WRT.E1 ROUTINE DECLARATION SECTION
023010  004167  161524          WRT.E1: JSR     R1,$SAVE2                       ;                                   3454
023014  152777  000001  172502          BISB    #1,@ML.REG+120                  ;                                   3468
023022  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                           3469
023026  006300                          ASL     R0
023030  006300                          ASL     R0
023032  006300                          ASL     R0
023034  010001                          MOV     R0,R1
023036  016100  015406                  MOV     ML.REG+2(R1),R0
023042  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
023046  046100  015410                  BIC     ML.REG+4(R1),R0
023052  016102  015412                  MOV     ML.REG+6(R1),R2
023056  050002                          BIS     R0,R2
023060  010277  172470                  MOV     R2,@ML.REG+150
023064  142777  000001  172432          BICB    #1,@ML.REG+120                  ;                                   3470
023072  000207                          RTS     PC                              ;                                   3454

                                ; Routine Size:  26 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (29)

;                3472  routine RD_E1 (TST_PAT, index, ERR_FLG) : novalue =
;                3473      begin
;                3474
;                3475  !++
;                3476  ! FUNCTIONAL DESCRIPTION:
;                3477  !
;                3478  !       COMPARES THE CONTENTS OF THE
;                3479  !       ECC CRC WORD REGISTER 1
;                3480  !       WITH THE MASKED DATA PATTERN
;                3481  !       GENERATED BY THE MACRO 'WRT_MASK'
;                3482  !
;                3483  !       IF THE COMPARE IS NOT EQUAL THEN
;                3484  !        THE FORMAL PARAMETER 'ERR_FLG' IS
;                3485  !       ASSIGNED A ONE TO INDICATE THE ERROR.
;                3486  !
;                3487  ! FORMAL PARAMETERS:
;                3488  !       TST_PAT
;                3489  !       DATA PATTERN TO BE MASKED AND
;                3490  !       COMPARED AGAINST THE CONTENTS
;                3491  !       OF THE REGISTER UNDER TEST.
;                3492  !
;                3493  !       INDEX
;                3494  !       USED BY THE MACRO WRT_MASK TO
;                3495  !       SELECT THE CURRENT REGISTERS ADDRESS,
;                3496  !       FORCED HI, FORCED LO AND DON'T CARE
;                3497  !       MASK INFORMATION.
;                3498  !
;                3499  !       ERR_FLG
;                3500  !       CONTAINS THE ADDRESS (PASSED BY REF)
;                3501  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;                3502  !       CALLER TO EXAMINE THE ERROR STATUS
;                3503  !       OF THE ROUTINE CALL.
;                3504  !
;                3505  ! IMPLICIT INPUTS:
;                3506  !       WT_DATA
;                3507  !         GETS LOADED WITH THE GENERATED
;                3508  !         WRT_MASK DATA PATTERN THUS ALLOWING
;                3509  !         CALLER TO PRINT FAILING GOOD DATA.
;                3510  !
;                3511  !       RD_DATA
;                3512  !         GETS LOADED WITH DATA READ FROM THE
;                3513  !         REGISTER THUS ALLOWING CALLER
;                3514  !         TO PRINT FAILING BAD DATA.
;                3515  !
;                3516  ! IMPLICIT OUTPUTS:
;                3517  !       GLOBAL LOCATION WR_DATA
;                3518  !       AND RD_DATA LOADED WITH GOOD
;                3519  !       AND BAD REGISTER DATA
;                3520  !
;                3521  !--
;                3522
;                3523      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (29)

;          3524      ECC_DM = ONE;                                !SET ECC DIAG MODE
;          3525      WT_DATA = WRT_MASK;                          !SAVE THE DATA WRITTEN TO THE REGISTER
;          3526      RD_DATA = .MLE1 or .IGNORE;                  !READ AND SAVE THE REGISTER
;          3527
;          3528      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
           3529
;          3530      ECC_DM = ZERO;                               !SET ERROR FLAG IF NEQ
;          3531                                                   !CLEAR ECC DIAG MODE
;          3532      end;

                                        .SBTTL  RD.E1 ROUTINE DECLARATION SECTION
023074  004167  161440          RD.E1:  JSR     R1,$SAVE2                       ;                                   3472
023100  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                           3523
023104  152777  000001  172412          BISB    #1,@ML.REG+120                  ;                                   3524
023112  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                           3525
023116  006300                          ASL     R0
023120  006300                          ASL     R0
023122  006300                          ASL     R0
023124  010001                          MOV     R0,R1
023126  016100  015406                  MOV     ML.REG+2(R1),R0
023132  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
023136  046100  015410                  BIC     ML.REG+4(R1),R0
023142  016102  015412                  MOV     ML.REG+6(R1),R2
023146  050002                          BIS     R0,R2
023150  010267  172174                  MOV     R2,WT.DATA
023154  017702  172374                  MOV     @ML.REG+150,R2                  ;                                   3526
023160  056102  015412                  BIS     ML.REG+6(R1),R2
023164  010267  172162                  MOV     R2,RD.DATA
023170  026767  172154  172154          CMP     WT.DATA,RD.DATA                 ;                                   3528
023176  001403                          BEQ     1$
023200  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
023206  142777  000001  172310  1$:     BICB    #1,@ML.REG+120                  ;                                   3530
023214  000207                          RTS     PC                              ;                                   3472

                                ; Routine Size:  41 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (30)

;                3533  routine WRT_E2 (TST_PAT, index) : novalue =
;                3534      begin
;                3535
;                3536  !++
;                3537  ! FUNCTIONAL DESCRIPTION:
;                3538  !
;                3539  !       LOADS THE ECC CRC WORD
;                3540  !       REGISTER 2 WITH A DATA PATTERN
;                3541  !       GENERATED BY THE MACRO
;                3542  !       WRT_MASK
;                3543  !
;                3544  ! FORMAL PARAMETERS:
;                3545  !
;                3546  !       TST_PAT
;                3547  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;                3548  !
;                3549  !       INDEX
;                3550  !       USED BY THE MACRO WRT_MASK
;                3551  !       TO SELECT THE CURRENT REGISTERS
;                3552  !       ADDRESS, FORCED HI, FORCED
;                3553  !       LO AND DON'T CARE MASK
;                3554  !       INFORMATION.
;                3555  !
;                3556  !--
;                3557
;                3558      ECC_DM = ONE;                          !SET ECC DIAG MODE
;                3559      MLE2_MASK = %o'177700';                !MASK OUT DATA DIAG BITS
;                3560      MLE2 = WRT_MASK;                       !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
;                3561      MLE2_MASK = %o'000000';                !RESTORE MLE2_MASK
;                3562      ECC_DM = ZERO;                         !CLEAR ECC DIAG MODE
;                3563      end;
;
                                        .SBTTL  WRT.E2 ROUTINE DECLARATION SECTION
023216  004167  161316          WRT.E2: JSR     R1,$SAVE2                       ;                               3533
023222  152777  000001  172274          BISB    #1,@#ML.REG+120                 ;                               3558
023230  012767  177700  172334          MOV     #-100,ML.REG+166                ;                               3559
023236  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                       3560
023242  006300                          ASL     R0
023244  006300                          ASL     R0
023246  006300                          ASL     R0
023250  010001                          MOV     R0,R1
023252  016100  015406                  MOV     ML.REG+2(R1),R0
023256  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
023262  046100  015410                  BIC     ML.REG+4(R1),R0
023266  016102  015412                  MOV     ML.REG+6(R1),R2
023272  050002                          BIS     R0,R2
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
                                        ;
023274  010277  172264                          MOV     R2,@ML.REG+160
023300  005067  172266                          CLR     ML.REG+166                      ;                       3561
023304  142777  000001  172212                  BICB    #1,@ML.REG+120                  ;                       3562
023312  000207                                  RTS     PC                              ;                       3533

                                        ; Routine Size:  31 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
5567 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5568 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (31)
5569 ;
5570 ;          3564  routine RD_E2 (TST_PAT, index, ERR_FLG) : novalue =
5571 ;          3565      begin
5572 ;          3566
5573 ;          3567  !++
5574 ;          3568  ! FUNCTIONAL DESCRIPTION:
5575 ;          3569  !
5576 ;          3570  !       COMPARES THE CONTENTS OF THE
5577 ;          3571  !       ECC CRC WORD REGISTER 2
5578 ;          3572  !       WITH THE MASKED DATA PATTERN
5579 ;          3573  !       GENERATED BY THE MACRO 'WRT_MASK'
5580 ;          3574  !
5581 ;          3575  !       IF THE COMPARE IS NOT EQUAL THEN
5582 ;          3576  !       THE FORMAL PARAMETER 'ERR_FLG' IS
5583 ;          3577  !       ASSIGNED A ONE TO INDICATE THE
5584 ;          3578  !       ERROR.
5585 ;          3579  !
5586 ;          3580  ! FORMAL PARAMETERS:
5587 ;          3581  !
5588 ;          3582  !       TST_PAT
5589 ;          3583  !       DATA PATTERN TO BE MASKED AND
5590 ;          3584  !       COMPARED AGAINST THE CONTENTS
5591 ;          3585  !       OF THE REGISTER UNDER TEST.
5592 ;          3586  !
5593 ;          3587  !       INDEX
5594 ;          3588  !       USED BY THE MACRO WRT_MASK TO
5595 ;          3589  !       SELECT THE CURRENT REGISTERS ADDRESS,
5596 ;          3590  !       FORCED HI, FORCED LO AND DON'T CARE
5597 ;          3591  !       MASK INFORMATION.
5598 ;          3592  !
5599 ;          3593  !       ERR_FLG
5600 ;          3594  !       CONTAINS THE ADDRESS (PASSED BY REF)
5601 ;          3595  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5602 ;          3596  !       CALLER TO EXAMINE THE ERROR STATUS
5603 ;          3597  !       OF THE ROUTINE CALL.
5604 ;          3598  !
5605 ;          3599  ! IMPLICIT INPUTS:
5606 ;          3600  !       WT_DATA
5607 ;          3601  !         GETS LOADED WITH THE GENERATED
5608 ;          3602  !         WRT_MASK DATA PATTERN THUS ALLOWING
5609 ;          3603  !         CALLER TO PRINT FAILING GOOD DATA.
5610 ;          3604  !
5611 ;          3605  !       RD_DATA
5612 ;          3606  !         GETS LOADED WITH DATA READ FROM THE
5613 ;          3607  !         REGISTER THUS ALLOWING CALLER
5614 ;          3608  !         TO PRINT FAILING BAD DATA.
5615 ;          3609  !
5616 ;          3610  ! IMPLICIT OUTPUTS:
5617 ;          3611  !       GLOBAL LOCATION WR_DATA
5618 ;          3612  !       AND RD_DATA LOADED WITH GOOD
5619 ;          3613  !       AND BAD REGISTER DATA
5620 ;          3614  !
5621 ;          3615  !-
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (31)

;          3616
;          3617      .ERR_FLG = ZERO;                    !CLEAR ERROR FLAG
;          3618      ECC_DM = ONE;                       !SET ECC DIAG MODE
;          3619      MLE2_MASK = %o'177700';             !MASK OUT DATA DIAG BITS
;          3620      WT_DATA = WRT_MASK;                 !SAVE THE DATA WRITTEN TO THE REGISTER
;          3621      RD_DATA = .MLE2 or .IGNORE;         !READ AND SAVE THE REGISTER
;          3622
;          3623      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3624
;          3625                                          !SET ERROR FLG IF NEQ
;          3626      MLE2_MASK = %o'000000';             !RESTORE MLE2 MASK
;          3627      ECC_DM = ZERO;                      !CLEAR ECC DIAG MODE
;          3628      end;

                                    .SBTTL  RD.E2 ROUTINE DECLARATION SECTION
023314  004167  161220          RD.E2:  JSR     R1,$SAVE2                       ;                       3564
023320  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3617
023324  152777  000001  172172          BISB    #1,@ML.REG+120                  ;                       3618
023332  012767  177700  172232          MOV     #-100,ML.REG+166                ;                       3619
023340  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3620
023344  006300                          ASL     R0
023346  006300                          ASL     R0
023350  006300                          ASL     R0
023352  010001                          MOV     R0,R1
023354  016100  015406                  MOV     ML.REG+2(R1),R0
023360  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
023364  046100  015410                  BIC     ML.REG+4(R1),R0
023370  016102  015412                  MOV     ML.REG+6(R1),R2
023374  050002                          BIS     R0,R2
023376  010267  171746                  MOV     R2,WT.DATA
023402  017702  172156                  MOV     @ML.REG+160,R2                  ;                       3621
023406  056102  015412                  BIS     ML.REG+6(R1),R2
023412  010267  171734                  MOV     R2,RD.DATA
023416  026767  171726  171726          CMP     WT.DATA,RD.DATA                 ;                       3623
023424  001403                          BEQ     1$
023426  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
023434  005067  172132          1$:     CLR     ML.REG+166                      ;                       3626
023440  142777  000001  172056          BICB    #1,@ML.REG+120                  ;                       3627
023446  000207                          RTS     PC                              ;                       3564

                                ; Routine Size:  46 words
                                ; Maximum stack depth per invocation:  3 words
```

```
5679 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5680 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (32)
5681
5682 ;          3629  routine WRT_PD (TST_PAT, index) : novalue =
5683 ;          3630      begin
5684 ;          3631
5685 ;          3632  !++
5686 ;          3633  ! FUNCTIONAL DESCRIPTION:
5687 ;          3634  !
5688 ;          3635  !       LOADS THE PROM DATA
5689 ;          3636  !       REGISTER WITH A DATA PATTERN
5690 ;          3637  !       GENERATED BY THE MACRO
5691 ;          3638  !       WRT_MASK
5692 ;          3639  !
5693 ;          3640  ! FORMAL PARAMETERS:
5694 ;          3641  !
5695 ;          3642  !       TST_PAT
5696 ;          3643  !       CURRENT DATA PATTERN TO BE
5697 ;          3644  !       LOADED IN THE REGISTER.
5698 ;          3645  !
5699 ;          3646  !       INDEX
5700 ;          3647  !       USED BY THE MACRO WRT_MASK
5701 ;          3648  !       TO SELECT THE CURRENT REGISTERS
5702 ;          3649  !       ADDRESS, FORCED HI, FORCED
5703 ;          3650  !       LO AND DON'T CARE MASK
5704 ;          3651  !       INFORMATION
5705 ;          3652  !
5706 ;          3653  !--
5707 ;          3654
5708 ;          3655      PROM_RW = ONE;                       !SET PROM READ WRITE
5709 ;          3656      DAT_DM = ONE;                        !SET DATA DIAG MODE
5710 ;          3657      MLPD = WRT_MASK;                     !LOAD MLPD WITH GENERATED WRT_MASK PATTERN
5711 ;          3658      DAT_CLK = ONE;                       !DO A DATA CLK
5712 ;          3659      PROM_RW = ZERO;                      !CLEAR PROM READ WRITE
5713 ;          3660      DAT_DM = ZERO;                       !CLEAR DATA DIAG MODE
5714 ;          3661      end;
5718
5719                                        .SBTTL  WRT.PD ROUTINE DECLARATION SECTION
5723 023450  004167  161064          WRT.PD: JSR     R1,$SAVE2                       ;                    3629
5724 023454  152777  000100  172042          BISB    #100,@ML.REG+120                ;                    3655
5725 023462  152777  000010  172034          BISB    #10,@ML.REG+120                 ;                    3656
5726 023470  016600  000010                  MOV     10(SP),R0                       ; INDEX,*            3657
5727 023474  006300                          ASL     R0
5728 023476  006300                          ASL     R0
5729 023500  006300                          ASL     R0
5730 023502  010001                          MOV     R0,R1
5731 023504  016100  015406                  MOV     ML.REG+2(R1),R0
5732 023510  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
5733 023514  046100  015410                  BIC     ML.REG+4(R1),R0
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

023520  016102  015412                          MOV     ML.REG+6(R1),R2
023524  050002                                  BIS     R0,R2
023526  010277  172102                          MOV     R2,@ML.REG+230
023532  152777  000020  171764                  BISB    #20,@ML.REG+120                 ;                                3658
023540  142777  000100  171756                  BICB    #100,@ML.REG+120                ;                                3659
023546  142777  000010  171750                  BICB    #10,@ML.REG+120                 ;                                3660
023554  000207                                  RTS     PC                              ;                                3629

                                        ; Routine Size:  35 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
5755 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5756 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (33)
5757 ;
5758 ;          3662 routine RD_PD (TST_PAT, index, ERR_FLG) : novalue =
5759 ;          3663     begin
5760 ;          3664
5761 ;          3665 !++
5762 ;          3666 ! FUNCTIONAL DESCRIPTION:
5763 ;          3667 !
5764 ;          3668 !       COMPARES THE CONTENTS OF THE
5765 ;          3669 !       PROM DATA REGISTER
5766 ;          3670 !       WITH THE MASKED DATA PATTERN
5767 ;          3671 !       GENERATED BY THE MACRO 'WRT_MASK'
5768 ;          3672 !
5769 ;          3673 !       IF THE COMPARE IS NOT EQUAL THEN
5770 ;          3674 !       THE FORMAL PARAMETER 'ERR FLG' IS
5771 ;          3675 !       ASSIGNED A ONE TO INDICATE THE
5772 ;          3676 !       ERROR
5773 ;          3677 !
5774 ;          3678 ! FORMAL PARAMETERS:
5775 ;          3679 !
5776 ;          3680 !       TST_PAT
5777 ;          3681 !       DATA PATTERN TO BE MASKED AND
5778 ;          3682 !       COMPARED AGAINST THE CONTENTS
5779 ;          3683 !       OF THE REGISTER UNDER TEST
5780 ;          3684 !
5781 ;          3685 !       INDEX
5782 ;          3686 !       USED BY THE MACRO WRT_MASK TO
5783 ;          3687 !       SELECT THE CURRENT REGISTERS ADDRESS,
5784 ;          3688 !       FORCED HI, FORCED LO AND DON'T CARE
5785 ;          3689 !       MASK INFORMATION.
5786 ;          3690 !
5787 ;          3691 !       ERR_FLG
5788 ;          3692 !       CONTAINS THE ADDRESS (PASSED BY REF)
5789 ;          3693 !       OF THE CALLERS ERROR FLG TO ENABLE THE
5790 ;          3694 !       CALLER TO EXAMINE THE ERROR STATUS
5791 ;          3695 !       OF THE ROUTINE CALL.
5792 ;          3696 !
5793 ;          3697 ! IMPLICIT INPUTS:
5794 ;          3698 !       WT_DATA
5795 ;          3699 !         GETS LOADED WITH THE GENERATED
5796 ;          3700 !         WRT_MASK DATA PATTERN THUS ALLOWING
5797 ;          3701 !         CALLER TO PRINT FAILING GOOD DATA.
5798 ;          3702 !
5799 ;          3703 !       RD_DATA
5800 ;          3704 !         GETS LOADED WITH DATA READ FROM THE
5801 ;          3705 !         REGISTER THUS ALLOWING CALLER
5802 ;          3706 !         TO PRINT FAILING BAD DATA.
5803 ;          3707 !
5804 ;          3708 ! IMPLICIT OUTPUTS:
5805 ;          3709 !       GLOBAL LOCATION WR_DATA
5806 ;          3710 !       AND RD_DATA LOADED WITH GOOD
5807 ;          3711 !       AND BAD REGISTER DATA
5808 ;          3712 !
5809 ;          3713 !--
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (33)
;
;          3714
;          3715      .ERR_FLG = ZERO;                  !CLEAR ERROR FLG
;          3716      PROM_RW = ONE;                    !SET PROM READ WRITE
;          3717      DAT_DM = ONE;                     !SET DATA DIAG MODE
;          3718      WT_DATA = WRT_MASK;               !SAVE THE DATA WRITTEN TO THE REGISTER
;          3719      RD_DATA = .MLPD or .IGNORE;       !READ AND SAVE THE REGISTER
;          3720
;          3721      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3722
;          3723                                        !SET ERROR FLAG IF NEQ
;          3724      PROM_RW = ZERO;                   !CLEAR PROM READ WRTE
;          3725      DAT_DM = ZERO;                    !CLEAR DATA DIAG MODE
;          3726      end;
5830
5831                                        .SBTTL  RD.PD ROUTINE DECLARATION SECTION
5835 023556  004167  160756          RD.PD:  JSR     R1,$SAVE2                       ;                       3662
5836 023562  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3715
5837 023566  152777  000100  171730          BISB    #100,@ML.REG+120                ;                       3716
5838 023574  152777  000010  171722          BISB    #10,@ML.REG+120                 ;                       3717
5839 023602  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3718
5840 023606  006300                          ASL     R0
5841 023610  006300                          ASL     R0
5842 023612  006300                          ASL     R0
5843 023614  010001                          MOV     R0,R1
5844 023616  016100  015406                  MOV     ML.REG+2(R1),R0
5845 023622  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
5846 023626  046100  015410                  BIC     ML.REG+4(R1),R0
5847 023632  016102  015412                  MOV     ML.REG+6(R1),R2
5848 023636  050002                          BIS     R0,R2
5849 023640  010267  171504                  MOV     R2,WT.DATA
5850 023644  017702  171764                  MOV     @ML.REG+230,R2                  ;                       3719
5851 023650  056102  015412                  BIS     ML.REG+6(R1),R2
5852 023654  010267  171472                  MOV     R2,RD.DATA
5853 023660  026767  171464  171464          CMP     WT.DATA,RD.DATA                 ;                       3721
5854 023666  001403                          BEQ     1$
5855 023670  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
5856 023676  142777  000100  171620  1$:     BICB    #100,@ML.REG+120                ;                       3724
5857 023704  142777  000010  171612          BICB    #10,@ML.REG+120                 ;                       3725
5858 023712  000207                          RTS     PC                              ;                       3662
5859
5860                                ; Routine Size:  47 words
5861                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (34)

;          3727  routine WRT_EL (TST_PAT, index) : novalue =
;          3728      begin
;          3729
;          3730  !++
;          3731  ! FUNCTIONAL DESCRIPTION:
;          3732  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          3733  !       WRITE REGISTER ALGORITHEM
;          3734  !
;          3735  ! FORMAL PARAMETERS:
;          3736  !       TST_PAT
;          3737  !       DATA PATTERN TO BE MASKED AND
;          3738  !       COMPARED AGAINST THE CONTENTS
;          3739  !       OF THE REGISTER UNDER TEST
;          3740  !
;          3741  !       INDEX
;          3742  !       USED BY THE MACRO WRT_MASK TO
;          3743  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3744  !       FORCED HI, FORCED LO AND DON'T CARE
;          3745  !       MASK INFORMATION.
;          3746  !
;          3747  !--
;          3748
;          3749  !
;          3750  !  ERROR LOCATION REG IS READ ONLY
;          3751      return;
;          3752      end;

                                        .SBTTL  WRT.EL ROUTINE DECLARATION SECTION
023714  000207                  WRT.EL: RTS     PC                              ;                                  3727

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words
```

```
5915 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
5916 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (35)
5917
5918 ;          3753  routine RD_EL (TST_PAT, index, ERR_FLG) : novalue =
5919 ;          3754      begin
5920 ;          3755
5921 ;          3756  !++
5922 ;          3757  ! FUNCTIONAL DESCRIPTION:
5923 ;          3758  !
5924 ;          3759  !       COMPARES THE CONTENTS OF THE
5925 ;          3760  !       ERROR LOCATION REGISTER
5926 ;          3761  !       WITH THE CONTENTS OF TST_PAT.
5927 ;          3762  !
5928 ;          3763  !       IF THE COMPARE IS NOT EQUAL THEN
5929 ;          3764  !       THE FORMAL PARAMETER 'ERR FLG' IS
5930 ;          3765  !       ASSIGNED A ONE TO INDICATE THE
5931 ;          3766  !       ERROR
5932 ;          3767  !
5933 ;          3768  ! FORMAL PARAMETERS:
5934 ;          3769  !       TST_PAT
5935 ;          3770  !       DATA PATTERN TO BE MASKED AND
5936 ;          3771  !       COMPARED AGAINST THE CONTENTS
5937 ;          3772  !       OF THE REGISTER UNDER TEST
5938 ;          3773  !
5939 ;          3774  !       INDEX
5940 ;          3775  !       USED BY THE MACRO WRT_MASK TO
5941 ;          3776  !       SELECT THE CURRENT REGISTERS ADDRESS,
5942 ;          3777  !       FORCED HI, FORCED LO AND DON'T CARE
5943 ;          3778  !       MASK INFORMATION.
5944 ;          3779  !
5945 ;          3780  !       ERR_FLG
5946 ;          3781  !       CONTAINS THE ADDRESS (PASSED BY REF)
5947 ;          3782  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5948 ;          3783  !       CALLER TO EXAMINE THE ERROR STATUS
5949 ;          3784  !       OF THE ROUTINE CALL.
5950 ;          3785  !
5951 ;          3786  ! IMPLICIT INPUTS:
5952 ;          3787  !       WT_DATA
5953 ;          3788  !         GETS LOADED WITH THE GENERATED
5954 ;          3789  !         WRT_MASK DATA PATTERN THUS ALLOWING
5955 ;          3790  !         CALLER TO PRINT FAILING GOOD DATA.
5956 ;          3791  !
5957 ;          3792  !       RD_DATA
5958 ;          3793  !         GETS LOADED WITH DATA READ FROM THE
5959 ;          3794  !         REGISTER THUS ALLOWING CALLER
5960 ;          3795  !         TO PRINT FAILING BAD DATA.
5961 ;          3796  !
5962 ;          3797  ! IMPLICIT OUTPUTS:
5963 ;          3798  !       GLOBAL LOCATION WR_DATA
5964 ;          3799  !       AND RD_DATA LOADED WITH GOOD
5965 ;          3800  !       AND BAD REGISTER DATA
5966 ;          3801  !
5967 ;          3802  !--
5968 ;          3803
5969 .          3804      .ERR_FLG = ZERO;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (35)
;
;          3805      WT_DATA = .TST_PAT;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3806      RD_DATA = .MLEC;                   !READ AND SAVE THE REGISTER
;          3807
;          3808      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ REGISTER FOR WT_DATA
;          3809
;          3810      end;
                                        .SBTTL  RD.EL ROUTINE DECLARATION SECTION
023716  005076  000002          RD.EL:  CLR     @2(SP)                  ; ERR.FLG                       3804
023722  016667  000006  171420          MOV     6(SP),WT.DATA           ; TST.PAT,*                     3805
023730  017767  171670  171414          MOV     @ML.REG+220,RD.DATA     ;                               3806
023736  026767  171410  171404          CMP     RD.DATA,WT.DATA         ;                               3808
023744  001403                          BEQ     1$
023746  012776  000001  000002          MOV     #1,@2(SP)               ; *,ERR.FLG
023754  000207                  1$:     RTS     PC                      ;                               3753

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (36)

;          3811  routine WRT_EE (TST_PAT, index) : novalue =
;          3812      begin
;          3813
;          3814  !++
;          3815  ! FUNCTIONAL DESCRIPTION:
;          3816  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          3817  !       WRITE REGISTER ALGORITHEM
;          3818  !
;          3819  ! FORMAL PARAMETERS:
;          3820  !       TST_PAT
;          3821  !       DATA PATTERN TO BE MASKED AND
;          3822  !       COMPARED AGAINST THE CONTENTS
;          3823  !       OF THE REGISTER UNDER TEST
;          3824  !
;          3825  !       INDEX
;          3826  !       USED BY THE MACRO WRT_MASK TO
;          3827  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3828  !       FORCED HI, FORCED LO AND DON'T CARE
;          3829  !       MASK INFORMATION.
;          3830  !
;          3831  !--
;          3832
;          3833  ! ECC ERROR REGISTER IS READ ONLY
;          3834      return;
;          3835      end;

                                        .SBTTL  WRT.EE ROUTINE DECLARATION SECTION
023756  000207                  WRT.EE: RTS     PC                              ;                                  3811

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words
```

```
6052 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6053 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (37)
6054 ;
6055 ;          3836  routine RD_EE (TST_PAT, index, ERR_FLG) : novalue =
6056 ;          3837      begin
6057 ;          3838
6058 ;          3839  !++
6059 ;          3840  ! FUNCTIONAL DESCRIPTION:
6060 ;          3841  !
6061 ;          3842  !       COMPARES THE CONTENTS OF THE
6062 ;          3843  !       ECC ERROR REGISTER WITH TST_PAT.
6063 ;          3844  !
6064 ;          3845  !       IF THE COMPARE IS NOT EQUAL THEN
6065 ;          3846  !       THE FORMAL PARAMETER 'ERR_FLG" IS
6066 ;          3847  !       ASSIGNED A ONE TO INDICATE THE
6067 ;          3848  !       ERROR.
6068 ;          3849  !
6069 ;          3850  ! FORMAL PARAMETERS:
6070 ;          3851  !       TST_PAT
6071 ;          3852  !       DATA PATTERN TO BE
6072 ;          3853  !       COMPARED AGAINST THE CONTENTS
6073 ;          3854  !       OF THE REGISTER UNDER TEST.
6074 ;          3855  !
6075 ;          3856  !       INDEX
6076 ;          3857  !       USED BY THE MACRO MLEE TO
6077 ;          3858  !       SELECT THE CURRENT REGISTERS ADDRESS.
6078 ;          3859  !
6079 ;          3860  !       ERR_FLG
6080 ;          3861  !       CONTAINS THE ADDRESS (PASSED
6081 ;          3862  !       BY REF) OF THE CALLERS ERROR FLG TO ENABLE
6082 ;          3863  !       THE CALLER TO EXAMINE THE ERROR STATUS
6083 ;          3864  !       OF THE ROUTINE CALL.
6084 ;          3865  !
6085 ;          3866  ! IMPLICIT INPUTS:
6086 ;          3867  !       WT_DATA
6087 ;          3868  !         GETS LOADED WITH THE TST_PAT
6088 ;          3869  !         THUS ALLOWING CALLER TO PRINT
6089 ;          3870  !         THE FAILING DATA.
6090 ;          3871  !
6091 ;          3872  !       RD_DATA
6092 ;          3873  !         GETS LOADED WITH DATA READ FROM THE
6093 ;          3874  !         REGISTER THUS ALLOWING CALLER
6094 ;          3875  !         TO PRINT FAILING BAD DATA.
6095 ;          3876  !
6096 ;          3877  ! IMPLICIT OUTPUTS:
6097 ;          3878  !       GLOBAL LOCATION WR_DATA
6098 ;          3879  !       AND RD_DATA LOADED WITH GOOD
6099 ;          3880  !       AND BAD REGISTER DATA
6100 ;          3881  !
6101 ;          3882  !--
6102 ;          3883
6103 ;          3884      .ERR_FLG = ZERO;                     !CLEAR THE ERROR FLAG
6104 ;          3885      WT_DATA = .TST_PAT;                  !SAVE DATA WRITTEN TO THE REGISTER
6105 ;          3886      RD_DATA = .MLEE;                     !READ AND SAVE THE REGISTER
6106 ;          3887
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (37)

;          3888      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;        !READ MLEE FOR TST_PAT
;          3889
;          3890                                                          !SET THE ERROR FLAG IF NEQ
;          3891      end;

                                        .SBTTL  RD.EE ROUTINE DECLARATION SECTION
023760  005076  000002          RD.EE:  CLR     @2(SP)                          ; ERR.FLG                       3884
023764  016667  000006  171356          MOV     6(SP),WT.DATA                   ; TST.PAT,*                     3885
023772  017767  171616  171352          MOV     @ML.REG+210,RD.DATA             ;                               3886
024000  026767  171346  171342          CMP     RD.DATA,WT.DATA                 ;                               3888
024006  001403                          BEQ     1$
024010  012776  000001  000002          MOV     #1,@2(SP)                       ; *,ERR.FLG
024016  000207                  1$:     RTS     PC                              ;                               3836

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALF>ML4AD.BLI.4 (38)
;
;          3892  routine WRT_D1 (TST_PAT, index) : novalue =
;          3893      begin
;          3894
;          3895  !++
;          3896  ! FUNCTIONAL DESCRIPTION:
;          3897  !       LOADS THE DATA DIAG REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3898  ! FORMAL PARAMETERS:
;          3899  !       TST_PAT
;          3900  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3901  !       INDEX
;          3902  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3903  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3904  !--
;          3905
;          3906      DAT_DM = ONE;                                !SET DATA DIAG MODE
;          3907      MLD1 = WRT_MASK;                             !LOAD MLD1 WITH GENERATED WRT_MASK PATTERN
;          3908      DAT_DM = ZERO;                               !CLEAR DATA DIAG MODE
;          3909      end;
;
                                        .SBTTL  WRT.D1 ROUTINE DECLARATION SECTION
024020  004167  160514          WRT.D1: JSR     R1,$SAVE2                       ;                       3892
024024  152777  000010  171472          BISB    #10,@ML.REG+120                 ;                       3906
024032  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3907
024036  006300                          ASL     R0
024040  006300                          ASL     R0
024042  006300                          ASL     R0
024044  010001                          MOV     R0,R1
024046  016100  015406                  MOV     ML.REG+2(R1),R0
024052  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
024056  046100  015410                  BIC     ML.REG+4(R1),R0
024062  016102  015412                  MOV     ML.REG+6(R1),R2
024066  050002                          BIS     R0,R2
024070  010277  171500                  MOV     R2,@ML.REG+170
024074  142777  000010  171422          BICB    #10,@ML.REG+120                 ;                       3908
024102  000207                          RTS     PC                              ;                       3892
;
                                ; Routine Size:  26 words
                                ; Maximum stack depth per invocation:  3 words
;
;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (39)

;          3910  routine RD_D1 (TST_PAT, index, ERR_FLG) : novalue =
;          3911      begin
;          3912
;          3913  !++
;          3914  ! FUNCTIONAL DESCRIPTION:
;          3915  !
;          3916  !       COMPARES THE CONTENTS OF THE
;          3917  !       DATA DIAG REGISTER 1
;          3918  !       WITH THE MASKED DATA PATTERN
;          3919  !       GENERATED BY THE MACRO "WRT_MASK".
;          3920  !
;          3921  !       IF THE COMPARE IS NOT EQUAL THEN
;          3922  !       THE FORMAL PARAMETER "ERR_FLG" IS
;          3923  !       ASSIGNED A ONE TO INDICATE THE
;          3924  !       ERROR.
;          3925  !
;          3926  ! FORMAL PARAMETERS:
;          3927  !
;          3928  !       TST_PAT
;          3929  !       DATA PATTERN TO BE MASKED AND
;          3930  !       COMPARED AGAINST THE CONTENTS
;          3931  !       OF THE REGISTER UNDER TEST.
;          3932  !
;          3933  !       INDEX
;          3934  !       USED BY THE MACRO WRT_MASK TO
;          3935  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3936  !       FORCED HI, FORCED LO AND DON'T CARE
;          3937  !       MASK INFORMATION.
;          3938  !
;          3939  !       ERR_FLG
;          3940  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3941  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3942  !       CALLER TO EXAMINE THE ERROR STATUS
;          3943  !       OF THE ROUTINE CALL.
;          3944  !
;          3945  ! IMPLICIT INPUTS:
;          3946  !       WT_DATA
;          3947  !         GETS LOADED WITH THE GENERATED
;          3948  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3949  !         CALLER TO PRINT FAILING GOOD DATA.
;          3950  !
;          3951  !       RD_DATA
;          3952  !         GETS LOADED WITH DATA READ FROM THE
;          3953  !         REGISTER THUS ALLOWING CALLER
;          3954  !         TO PRINT FAILING BAD DATA.
;          3955  !
;          3956  ! IMPLICIT OUTPUTS:
;          3957  !       GLOBAL LOCATION WR_DATA
;          3958  !       AND RD_DATA LOADED WITH GOOD
;          3959  !       AND BAD REGISTER DATA
;          3960  !
;          3961  !--
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (39)

;          3962
;          3963        .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLG
;          3964        DAT_DM = ONE;                             !SET DATA DIAG MODE
;          3965        ML_FUNC = write;                          !LOAD MLCS1 WITH WRITE FUNCTION
;          3966        DAT_CLK = ONE;                            !DO A DATA CLK
;          3967
;          3968        if .REG_INIT_FLG IS_SET                   !SEE IF CALLER IS REG INIT TEST
;          3969                                                  !SET ERROR FLAG IF NEQ
;          3970        then
;          3971            begin
;          3972            CLR_MBUS;                             !CLEAR MBUS TO GENERATE INIT DATA
;          3973            DAT_DM = ONE;
;          3974            end;
;          3975
;          3976        WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          3977        RD_DATA = .MLD1;                          !READ AND SAVE THE REGISTER
;          3978
;          3979        if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLD1 FOR WRT_MASK
;          3980
;          3981                                                  !SET ERR_FLG IF NEQ
;          3982        CLR_MBUS;                                 !CLEAR THE MBUS
;          3983        end;

                                        .SBTTL  RD.D1 ROUTINE DECLARATION SECTION
024104  004167  160430          RD.D1:  JSR     R1,$SAVE2                       ;                       3910
024110  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3963
024114  152777  000010  171402          BISB    #10,@ML.REG+120                 ;                       3964
024122  142777  000077  171254          BICB    #77,@ML.REG                     ;                       3965
024130  152777  000061  171246          BISB    #61,@ML.REG
024136  152777  000020  171360          BISB    #20,@ML.REG+120                 ;                       3966
024144  026727  171210  000001          CMP     REG.INIT.FLG,#1                 ;                       3968
024152  001017                          BNE     1$
024154  152777  000040  171262          BISB    #40,@ML.REG+40                  ;                       3971
024162  016701  171644                  MOV     ML.DUT,R1
024166  042701  177770                  BIC     #177770,R1
024172  142777  000007  171244          BICB    #7,@ML.REG+40
024200  150177  171240                  BISB    R1,@ML.REG+40
024204  152777  000010  171312          BISB    #10,@ML.REG+120                 ;                       3973
024212  016600  000012          1$:     MOV     12(SP),R0                       ; INDEX,*               3976
024216  006300                          ASL     R0
024220  006300                          ASL     R0
024222  006300                          ASL     R0
024224  010001                          MOV     R0,R1
024226  016100  015406                  MOV     ML.REG+2(R1),R0
024232  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
024236  046100  015410                  BIC     ML.REG+4(R1),R0
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<
                                                MOV     ML.REG+6(R1),R2
                                                BIS     R0,R2
                                                MOV     R2,WT.DATA
                                                MOV     @ML.REG+170,RD.DATA             ;                                       3977
                                                CMP     RD.DATA,WT.DATA                 ;                                       3979
                                                BEQ     2$
                                                MOV     #1,@10(SP)                      ; *,ERR.FLG
                                2$:             BISB    #40,@ML.REG+40
                                                MOV     ML.DUT,R2
                                                BIC     #177770,R2
                                                BICB    #7,@ML.REG+40
                                                BISB    R2,@ML.REG+40
                                                RTS     PC                              ;                                       3910

                                        ; Routine Size:  75 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
6332 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6333 ;                  ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (40)
6334
6335 ;          3984   routine WRT_D2 (TST_PAT, index) : novalue =
6336 ;          3985       begin
6337 ;          3986
6338 ;          3987   !++
6339 ;          3988   ! FUNCTIONAL DESCRIPTION:
6340 ;          3989   !       LOADS THE DATA DIAG REG 2 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
6341 ;          3990   ! FORMAL PARAMETERS:
6342 ;          3991   !       TST_PAT
6343 ;          3992   !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
6344 ;          3993   !       INDEX
6345 ;          3994   !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
6346 ;          3995   !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
6347 ;          3996   !--
6348 ;          3997
6349 ;          3998       DAT_DM = ONE;                          !SET DATA DIAG MODE
6350 ;          3999       MLD2 = WRT_MASK;                       !LOAD MLD2 WITH GENERATED WRT_MASK PATTERN
6351 ;          4000       DAT_DM = ZERO;                         !CLEAR DATA DIAG MODE
6352 ;          4001       end;
6356
6357                                        .SBTTL  WRT.D2 ROUTINE DECLARATION SECTION
6361 024332  004167  160202          WRT.D2: JSR     R1,$SAVE2                       ;                              3984
6362 024336  152777  000010  171160          BISB    #10,@ML.REG+120                 ;                              3998
6363 024344  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                      3999
6364 024350  006300                          ASL     R0
6365 024352  006300                          ASL     R0
6366 024354  006300                          ASL     R0
6367 024356  010001                          MOV     R0,R1
6368 024360  016100  015406                  MOV     ML.REG+2(R1),R0
6369 024364  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
6370 024370  046100  015410                  BIC     ML.REG+4(R1),R0
6371 024374  016102  015412                  MOV     ML.REG+6(R1),R2
6372 024400  050002                          BIS     R0,R2
6373 024402  010277  171176                  MOV     R2,@ML.REG+200
6374 024406  142777  000010  171110          BICB    #10,@ML.REG+120                 ;                              4000
6375 024414  000207                          RTS     PC                              ;                              3984
6376
6377                                ; Routine Size:  26 words
6378                                ; Maximum stack depth per invocation:  3 words
6383
6384
```

```
6386 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6387 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (41)
6388 ;
6389 ;          4002  routine RD_D2 (TST_PAT, index, ERR_FLG) : novalue =
6390 ;          4003      begin
6391 ;          4004
6392 ;          4005  !++
6393 ;          4006  ! FUNCTIONAL DESCRIPTION:
6394 ;          4007  !
6395 ;          4008  !       COMPARE THE CONTENTS OF THE
6396 ;          4009  !       DATA DIAG REGISTER 2
6397 ;          4010  !       WITH THE MASKED DATA PATTERN
6398 ;          4011  !       GENERATED BY THE MACRO 'WRT_MASK''.
6399 ;          4012  !       IF THE COMPARE IS NOT EQUAL THEN THE
6400 ;          4013  !       FORMAL PARAMETER 'ERR_FLG'' IS
6401 ;          4014  !       ASSIGNED A ONE TO INDICATE THE
6402 ;          4015  !       ERROR.
6403 ;          4016  !
6404 ;          4017  ! FORMAL PARAMETERS:
6405 ;          4018  !
6406 ;          4019  !       TST_PAT
6407 ;          4020  !       DATA PATTERN TO BE MASKED AND
6408 ;          4021  !       COMPARED AGAINST THE CONTENTS
6409 ;          4022  !       OF THE REGISTER UNDER TEST.
6410 ;          4023  !
6411 ;          4024  !       INDEX
6412 ;          4025  !       USED BY THE MACRO WRT_MASK TO
6413 ;          4026  !       SELECT THE CURRENT REGISTERS ADDRESS,
6414 ;          4027  !       FORCED HI, FORCED LO AND DON'T CARE
6415 ;          4028  !       MASK INFOMATION.
6416 ;          4029  !
6417 ;          4030  !       ERR_FLG
6418 ;          4031  !       CONTAINS THE ADDRESS (PASSED BY REF)
6419 ;          4032  !       OF THE CALLERS ERROR FLG TO ENABLE THE
6420 ;          4033  !       CALLER TO EXAMINE THE ERROR STATUS
6421 ;          4034  !       OF THE ROUTINE CALL.
6422 ;          4035  !
6423 ;          4036  ! IMPLICIT INPUTS:
6424 ;          4037  !       WT_DATA
6425 ;          4038  !         GETS LOADED WITH THE GENERATED
6426 ;          4039  !         WRT_MASK DATA PATTERN THUS ALLOWING
6427 ;          4040  !         CALLER TO PRINT FAILING GOOD DATA.
6428 ;          4041  !
6429 ;          4042  !       RD_DATA
6430 ;          4043  !         GETS LOADED WITH DATA READ FROM THE
6431 ;          4044  !         REGISTER THUS ALLOWING CALLER
6432 ;          4045  !         TO PRINT FAILING BAD DATA.
6433 ;          4046  !
6434 ;          4047  ! IMPLICIT OUTPUTS:
6435 ;          4048  !       GLOBAL LOCATION WR_DATA
6436 ;          4049  !       AND RD_DATA LOADED WITH GOOD
6437 ;          4050  !       AND BAD REGISTER DATA
6438 ;          4051  !
6439 ;          4052  !--
6440 ;          4053
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (41)

;          4054      .ERR_FLG = ZERO;                     !CLEAR ERROR FLAG
;          4055      DAT_DM = ONE;                        !SET DATA DIAG MODE
;          4056      ML_FUNC = write;                     !LOAD WRITE FUNC TO CS1
;          4057      DAT_CLK = ONE;                       !DO A DATA CLOCK
;          4058
;          4059      if .REG_INIT_FLG IS_SET              !SEE IF CALLER IS REG INIT TEST
;          4060      then                                 !CLEAR MBUS TO GENERATE INIT DATA
;          4061          begin
;          4062          CLR_MBUS;
;          4063          DAT_DM = ONE;
;          4064          end;
;          4065
;          4066      WT_DATA = WRT_MASK;                  !SAVE THE DATA WRITTEN TO THE REGISTER
;          4067      RD_DATA = .MLD2;                     !READ AND SAVE THE REGISTER
;          4068
;          4069      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLD2 FR WRT_MASK PATTERN
;          4070
;          4071                                           !SET ERROR FLAG IF NEQ
;          4072      CLR_MBUS;                            !CLR MASS BUSS
;          4073      end;

                                        .SBTTL  RD.D2 ROUTINE DECLARATION SECTION
6473 024416  004167  160116        RD.D2:  JSR     R1,$SAVE2                       ;                       4002
6474 024422  005076  000010                CLR     @10(SP)                         ; ERR.FLG               4054
6475 024426  152777  000010  171070        BISB    #10,@ML.REG+120                 ;                       4055
6476 024434  142777  000077  170742        BICB    #77,@ML.REG                     ;                       4056
6477 024442  152777  000061  170734        BISB    #61,@ML.REG
6478 024450  152777  000020  171046        BISB    #20,@ML.REG+120                 ;                       4057
6479 024456  026727  170676  000001        CMP     REG.INIT.FLG,#1                 ;                       4059
6480 024464  001017                        BNE     1$
6481 024466  152777  000040  170750        BISB    #40,@ML.REG+40                  ;                       4061
6482 024474  016701  171332                MOV     ML.DUT,R1
6483 024500  042701  177770                BIC     #177770,R1
6484 024504  142777  000007  170732        BICB    #7,@ML.REG+40
6485 024512  150177  170726                BISB    R1,@ML.REG+40
6486 024516  152777  000010  171000        BISB    #10,@ML.REG+120                 ;                       4063
6487 024524  016600  000012        1$:     MOV     12(SP),R0                       ; INDEX,*               4066
6488 024530  006300                        ASL     R0
6489 024532  006300                        ASL     R0
6490 024534  006300                        ASL     R0
6491 024536  010001                        MOV     R0,R1
6492 024540  016100  015406                MOV     ML.REG+2(R1),R0
6493 024544  056600  000014                BIS     14(SP),R0                       ; TST.PAT,*
6494 024550  046100  015410                BIC     ML.REG+4(R1),R0
6495 024554  016102  015412                MOV     ML.REG+6(R1),R2
6496 024560  050002                        BIS     R0,R2
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

024562  010267  170562                          MOV     R2,WT.DATA
024566  017767  171012  170556                  MOV     @ML.REG+200,RD.DATA             ;                                4067
024574  026767  170552  170546                  CMP     RD.DATA,WT.DATA                 ;                                4069
024602  001403                                  BEQ     2$
024604  012776  000001  000010                  MOV     #1,@10(SP)                      ; *,ERR.FLG
024612  152777  000040  170624  2$:             BISB    #40,@ML.REG+40
024620  016702  171206                          MOV     ML.DUT,R2
024624  042702  177770                          BIC     #177770,R2
024630  142777  000007  170606                  BICB    #7,@ML.REG+40
024636  150277  170602                          BISB    R2,@ML.REG+40
024642  000207                                  RTS     PC                              ;                                4002

                                        ; Routine Size:  75 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
6522 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6523 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (42)
6524
6525 ;          4074  routine WRT_D3 (TST_PAT, index) : novalue =
6526 ;          4075      begin
6527 ;          4076
6528 ;          4077  !++
6529 ;          4078  ! FUNCTIONAL DESCRIPTION:
6530 ;          4079  !
6531 ;          4080  !       LOADS THE DATA DIAG
6532 ;          4081  !       REGISTER 3 WITH A DATA PATTERN
6533 ;          4082  !       GENERATED BY THE MACRO
6534 ;          4083  !       WRT_MASK.
6535 ;          4084  !
6536 ;          4085  ! FORMAL PARAMETERS:
6537 ;          4086  !
6538 ;          4087  !       TST_PAT
6539 ;          4088  !       CURRENT DATA PATTERN TO BE
6540 ;          4089  !       LOADED IN THE REGISTER.
6541 ;          4090  !
6542 ;          4091  !       INDEX
6543 ;          4092  !       USE BY THE MACRO WRT_MASK
6544 ;          4093  !       TO SELECT THE CURRENT REGISTERS
6545 ;          4094  !       ADDRESS, FORCED HI, FORCED
6546 ;          4095  !       LO AND DON'T CARE MASK
6547 ;          4096  !       INFORMATION.
6548 ;          4097  !
6549 ;          4098  !--
6550 ;          4099
6551 ;          4100      DAT_DM = ONE;                        !SET DATA DIAG MODE
6552 ;          4101      MLE2_MASK = %o'000377';              !MASK OUT ECC CRC WORD BITS
6553 ;          4102      MLE2 = WRT_MASK;                     !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
6554 ;          4103      MLE2_MASK = %o'100300';              !RESTORE MASK
6555 ;          4104      DAT_DM = ZERO;                       !CLEAR DATA DIAG MODE.
6556 ;          4105      end;
6560
6561                                        .SBTTL  WRT.D3 ROUTINE DECLARATION SECTION
6565 024644  004167  157670          WRT.D3: JSR     R1,$SAVE2                       ;                              4074
6566 024650  152777  000010  170646          BISB    #10,@ML.REG+120                 ;                              4100
6567 024656  012767  000377  170706          MOV     #377,ML.REG+166                 ;                              4101
6568 024664  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                      4102
6569 024670  006300                          ASL     R0
6570 024672  006300                          ASL     R0
6571 024674  006300                          ASL     R0
6572 024676  010001                          MOV     R0,R1
6573 024700  016100  015406                  MOV     ML.REG+2(R1),R0
6574 024704  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
6575 024710  046100  015410                  BIC     ML.REG+4(R1),R0
6576 024714  016102  015412                  MOV     ML.REG+6(R1),R2
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

024720  050002                                  BIS     R0,R2
024722  010277  170636                          MOV     R2,@ML.REG+160
024726  012767  100300  170636                  MOV     #-77500,ML.REG+166              ;                                4103
024734  142777  000010  170562                  BICB    #10,@ML.REG+120                 ;                                4104
024742  000207                                  RTS     PC                              ;                                4074

                                        ; Routine Size:  32 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (43)

;          4106  routine RD_D3 (TST_PAT, index, ERR_FLG) : novalue =
;          4107      begin
;          4108
;          4109  !++
;          4110  ! FUNCTIONAL DESCRIPTION:
;          4111  !
;          4112  !       COMPARES THE CONTENTS OF THE
;          4113  !       DATA DIAG REGISTER 3
;          4114  !       WITH THE MASKED DATA PATTERN
;          4115  !       GENERATED BY THE MACRO "WRT_MASK".
;          4116  !
;          4117  !       IF THE COMPARE IS NOT EQUAL THE
;          4118  !       FORMAL PARAMETER "ERR_FLG" IS
;          4119  !       ASSIGNED A ONE TO INDICATE THE
;          4120  !       ERROR.
;          4121  !
;          4122  ! FORMAL PARAMETERS:
;          4123  !
;          4124  !       TST_PAT
;          4125  !       DATA PATTERN TO BE MASKED AND
;          4126  !       COMPARED AGAINST THE CONTENTS
;          4127  !       OF THE REGISTER UNDER TEST.
;          4128  !
;          4129  !       INDEX
;          4130  !       USED BY THE MACRO WRT_MASK TO
;          4131  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          4132  !       FORCED HI, FORCED LO AND DON'T CARE
;          4133  !       MASK INFORMATION
;          4134  !
;          4135  !       ERR_FLG
;          4136  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          4137  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          4138  !       CALLER TO EXAMINE THE ERROR STATUS
;          4139  !       OF THE ROUTINE CALL.
;          4140  !
;          4141  ! IMPLICIT INPUTS:
;          4142  !       WT_DATA
;          4143  !         GETS LOADED WITH THE GENERATED
;          4144  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          4145  !         CALLER TO PRINT FAILING GOOD DATA.
;          4146  !
;          4147  !       RD_DATA
;          4148  !         GETS LOADED WITH DATA READ FROM THE
;          4149  !         REGISTER THUS ALLOWING CALLER
;          4150  !         TO PRINT FAILING BAD DATA.
;          4151  !
;          4152  ! IMPLICIT OUTPUTS:
;          4153  !       GLOBAL LOCATION WR_DATA
;          4154  !       AND RD_DATA LOADED WITH GOOD
;          4155  !       AND BAD REGISTER DATA
;          4156  !
;          4157  !--
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (43)

;          4158
;          4159      .ERR_FLG = ZERO;                    !CLEAR ERROR FLAG
;          4160      MLE2_MASK = %o'000377';             !SET DATA DIAG MODE
;          4161      DAT_DM = ONE;
;          4162      ML_FUNC = write;                    !LOAD WRITE FUNCTION TO MLCS1
;          4163      DAT_CLK = ONE;                      !DO A DATA CLOCK
;          4164
;          4165      if .REG_INIT_FLG IS_SET             !SEE IF CALLER IS  REG INIT TEST
;          4166      then                                !CLEAR  MBUS TO GENERATE INIT DATA
;          4167          begin
;          4168          CLR_MBUS;
;          4169          DAT_DM = ONE;
;          4170          end;
;          4171
;          4172      WT_DATA = WRT_MASK;                 !SAVE THE DATA WRITTEN TO THE REGISTER
;          4173      RD_DATA = .MLE2 or .IGNORE;         !READ AND SAVE THE REGISTER
;          4174
;          4175      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          4176
;          4177      MLE2_MASK = %o'100300';
;          4178      CLR_MBUS;                           !CLEAR THE MASS BUS
;          4179      end;

                                        .SBTTL  RD.D3 ROUTINE DECLARATION SECTION
024744  004167  157570          RD.D3:  JSR     R1,$SAVE2                       ;                       4106
024750  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               4159
024754  012767  000377  170610          MOV     #377,ML.REG+166                 ;                       4160
024762  152777  000010  170534          BISB    #10,@ML.REG+120                 ;                       4161
024770  142777  000077  170406          BICB    #77,@ML.REG                     ;                       4162
024776  152777  000061  170400          BISB    #61,@ML.REG
025004  152777  000020  170512          BISB    #20,@ML.REG+120                 ;                       4163
025012  026727  170342  000001          CMP     REG.INIT.FLG,#1                 ;                       4165
025020  001017                          BNE     1$
025022  152777  000040  170414          BISB    #40,@ML.REG+40                  ;                       4167
025030  016701  170776                  MOV     ML.OUT,R1
025034  042701  177770                  BIC     #177770,R1
025040  142777  000007  170376          BICB    #7,@ML.REG+40
025046  150177  170372                  BISB    R1,@ML.REG+40
025052  152777  000010  170444          BISB    #10,@ML.REG+120                 ;                       4169
025060  016600  000012          1$:     MOV     12(SP),R0                       ; INDEX.*               4172
025064  006300                          ASL     R0
025066  006300                          ASL     R0
025070  006300                          ASL     R0
025072  010001                          MOV     R0,R1
025074  016100  015406                  MOV     ML.REG+2(R1),R0
025100  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

025104  046100  015410                          BIC     ML.REG+4(R1),R0
025110  016102  015412                          MOV     ML.REG+6(R1),R2
025114  050002                                  BIS     R0,R2
025116  010267  170226                          MOV     R2,WT.DATA
025122  017702  170436                          MOV     @ML.REG+160,R2                  ;                                4173
025126  056102  015412                          BIS     ML.REG+6(R1),R2
025132  010267  170214                          MOV     R2,RD.DATA
025136  026767  170206  170206                  CMP     WT.DATA,RD.DATA                 ;                                4175
025144  001403                                  BEQ     2$
025146  012776  000001  000010                  MOV     #1,@10(SP)                      ; *,ERR.FLG
025154  012767  100300  170410  2$:             MOV     #-77500,ML.REG+166              ;                                4177
025162  152777  000040  170254                  BISB    #40,@ML.REG+40
025170  016702  170636                          MOV     ML.DUT,R2
025174  042702  177770                          BIC     #177770,R2
025200  142777  000007  170236                  BICB    #7,@ML.REG+40
025206  150277  170232                          BISB    R2,@ML.REG+40
025212  000207                                  RTS     PC                              ;                                4106

                                        ; Routine Size:  84 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (44)
;ML4AD
;                ROUTINE DECLARATION SECTION

;          4180  routine WRT_DS (TST_PAT, index) : novalue =
;          4181      begin
;          4182
;          4183  !++
;          4184  ! FUNCTIONAL DESCRIPTION:
;          4185  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          4186  !       WRITE REGISTER ALGORITHEM
;          4187  !
;          4188  ! FORMAL PARAMETERS:
;          4189  !       TST_PAT
;          4190  !       DATA PATTERN TO BE MASKED AND
;          4191  !       COMPARED AGAINST THE CONTENTS
;          4192  !       OF THE REGISTER UNDER TEST
;          4193  !
;          4194  !       INDEX
;          4195  !       USED BY THE MACRO WRT_MASK TO
;          4196  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          4197  !       FORCED HI, FORCED LO AND DON'T CARE
;          4198  !       MASK INFORMATION.
;          4199  !
;          4200  !--
;          4201
;          4202  !
;          4203  !  DRIVE STATUS REG IS READ ONLY
;          4204      return;
;          4205      end;
;
;                                .SBTTL  WRT.DS ROUTINE DECLARATION SECTION
;025214  000207          WRT.DS: RTS     PC                              ;  4180
;
;                               ; Routine Size:  1 word
;                               ; Maximum stack depth per invocation:  0 words
;
;
```

```
6786 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6787 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (45)
6788 ;
6789 ;          4206  routine RD_DS (TST_PAT, index, ERR_FLG) : novalue =
6790 ;          4207      begin
6791 ;          4208
6792 ;          4209  !++
6793 ;          4210  ! FUNCTIONAL DESCRIPTION:
6794 ;          4211  !
6795 ;          4212  !       COMPARES THE CONTENTS OF THE
6796 ;          4213  !       DRIVE STATUS REGISTER WITH THE
6797 ;          4214  !       MASKED DATA PATTERN
6798 ;          4215  !       GENERATED BY THE MACRO 'WRT_MASK'.
6799 ;          4216  !
6800 ;          4217  !       IF THE COMPARE IS NOT EQUAL THEN
6801 ;          4218  !       THE FORMAL PARAMETER 'ERR_FLG' IS
6802 ;          4219  !       ASSIGNED A ONE TO INDICATE THE
6803 ;          4220  !       ERROR.
6804 ;          4221  !
6805 ;          4222  ! FORMAL PARAMETERS:
6806 ;          4223  !
6807 ;          4224  !       TST_PAT
6808 ;          4225  !       DATA PATTERN TO BE MASKED AND
6809 ;          4226  !       COMPARED AGAINST THE CONTENTS
6810 ;          4227  !       OF THE REGISTER UNDER TEST.
6811 ;          4228  !
6812 ;          4229  !       INDEX
6813 ;          4230  !       USED BY THE MACRO WRT_MASK TO
6814 ;          4231  !       SELECT THE CURRENT REGISTERS ADDRESS.
6815 ;          4232  !       FORCED HI, FORCED LO AND DON'T CARE
6816 ;          4233  !       MASK INFORMATION.
6817 ;          4234  !
6818 ;          4235  !       ERR_FLG
6819 ;          4236  !       CONTAINS THE ADDRESS (PASSED BY REF)
6820 ;          4237  !       OF THE CALLERS ERROR FLG TO ENABLE THE
6821 ;          4238  !       CALLER TO EXAMINE THE ERROR STATUS
6822 ;          4239  !       OF THE ROUTINE CALL.
6823 ;          4240  !
6824 ;          4241  ! IMPLICIT INPUTS:
6825 ;          4242  !       WT_DATA
6826 ;          4243  !         GETS LOADED WITH THE GENERATED
6827 ;          4244  !         WRT_MASK DATA PATTERN THUS ALLOWING
6828 ;          4245  !         CALLER TO PRINT FAILING GOOD DATA.
6829 ;          4246  !
6830 ;          4247  !       RD_DATA
6831 ;          4248  !         GETS LOADED WITH DATA READ FROM THE
6832 ;          4249  !         REGISTER THUS ALLOWING CALLER
6833 ;          4250  !         TO PRINT FAILING BAD DATA.
6834 ;          4251  !
6835 ;          4252  ! IMPLICIT OUTPUTS:
6836 ;          4253  !       GLOBAL LOCATION WR_DATA
6837 ;          4254  !       AND RD_DATA LOADED WITH GOOD
6838 ;          4255  !       AND BAD REGISTER DATA
6839 ;          4256  !
6840 ;          4257  !--
```

```
6842 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6843 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (45)
6844
6845 ;          4258
6846 ;          4259      .ERR_FLG = ZERO;                     !CLEAR THE ERROR FLAG
6847 ;          4260      WT_DATA = WRT_MASK;                  !SAVE THE DATA WRITTEN TO THE REGISTER
6848 ;          4261      RD_DATA = .MLDS or .IGNORE;          !READ AND SAVE THE REGISTER
6849 ;          4262
6850 ;          4263      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
6851 ;          4264
6852 ;          4265                                           !SET ERROR FLAG IF NEQ
6853 ;          4266      end;
6857
6858                                        .SBTTL  RD.DS ROUTINE DECLARATION SECTION
6862 025216  004167  157316          RD.DS:  JSR     R1,$SAVE2                       ;                              4206
6863 025222  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                      4259
6864 025226  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                      4260
6865 025232  006300                          ASL     R0
6866 025234  006300                          ASL     R0
6867 025236  006300                          ASL     R0
6868 025240  010001                          MOV     R0,R1
6869 025242  016100  015406                  MOV     ML.REG+2(R1),R0
6870 025246  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
6871 025252  046100  015410                  BIC     ML.REG+4(R1),R0
6872 025256  016102  015412                  MOV     ML.REG+6(R1),R2
6873 025262  050002                          BIS     R0,R2
6874 025264  010267  170060                  MOV     R2,WT.DATA
6875 025270  017702  170160                  MOV     @ML.REG+50,R2                   ;                              4261
6876 025274  056102  015412                  BIS     ML.REG+6(R1),R2
6877 025300  010267  170046                  MOV     R2,RD.DATA
6878 025304  026767  170040  170040          CMP     WT.DATA,RD.DATA                 ;                              4263
6879 025312  001403                          BEQ     1$
6880 025314  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
6881 025322  000207                  1$:     RTS     PC                              ;                              4206
6862
6883                                        ; Routine Size:  35 words
6884                                        ; Maximum stack depth per invocation:  3 words
6889
6890
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (46)

;          4267  routine WRT_REG (TST_PAT, REG_SEL, index) : novalue =
;          4268      begin
;          4269
;          4270  !++
;          4271  ! FUNCTIONAL DESCRIPTION:
;          4272  !       A ROUTINE TO SELECTIVELY
;          4273  !       CALLED ROUTINES WHICH
;          4274  !       WRITE TO INDIVIDUAL ML11
;          4275  !       REGISTERS
;          4276  !
;          4277  ! FORMAL PARAMETERS:
;          4278  !       REG_SEL
;          4279  !       CASE SELECT EXPRESSION TO
;          4280  !       SELECT THE WRITE REGISTER
;          4281  !       ROUTINE TO CALLED
;          4282  !
;          4283  !       TST_PAT
;          4284  !       DATA PATTERN WHICH THE SELECTED
;          4285  !       REGISTER WILL BE TESTED AGAINST
;          4286  !
;          4287  !       INDEX
;          4288  !       LOADED WITH THE ML_REG INDEX
;          4289  !       SELECT NUMBER OF THE REGISTER
;          4290  !       BEING TESTED
;          4291  !
;          4292  ! SIDE EFFECTS:
;          4293  !       WHEN A WRITE REGISTER ROUTINE IS CALLED
;          4294  !       THE VARIABLE 'INDEX' FROM THE CALLING
;          4295  !       TEST IS LOADED WITH THE REGISTERS
;          4296  !       ML_REG INDEX NUMBER.
;          4297  !
;          4298  !       THIS ENABLES THE CALLING TEST TO FIND
;          4299  !       THE FAILING REGISTER ADDRESS.
;          4300  !
;          4301  !--
;          4302
;          4303      case .REG_SEL from 0 to 13 of                 !SELECT THE WRITE REGISTER ROUTINE CALL
;          4304          set
;          4305
;          4306          [0] :
;          4307              WRT_CS1 (.TST_PAT, .index = 0);       !CALL ROUTINE TO LOAD MLCS1
;          4308
;          4309          [1] :
;          4310              WRT_ER (.TST_PAT, .index = 6);        !CALL ROUTINE TO LOAD MLER
;          4311
;          4312          [2] :
;          4313              WRT_DA (.TST_PAT, .index = 3);        !CALL ROUTINE TO LOAD MLDA
;          4314
;          4315          [3] :
;          4316              WRT_MR (.TST_PAT, .index = 10);       !CALL ROUTINE TO LOAD MLMR
;          4317
;          4318          [4] :
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (46)

;          4319                WRT_E1 (.TST_PAT, .index = 13);     !CALL ROUTINE TO LOAD MLE1
;          4320
;          4321            [5] :
;          4322                WRT_E2 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
;          4323
;          4324            [6] :
;          4325                WRT_PA (.TST_PAT, .index = 8);      !CALL ROUTINE TO LOAD MLPA
;          4326
;          4327            [7] :
;          4328                WRT_PD (.TST_PAT, .index = 19);     !CALL ROUTINE TO LOAD MLPD
;          4329
;          4330            [8] :
;          4331                WRT_EE (.TST_PAT, .index = 17);     !CALL ROUTINE TO LOAD MLEE
;          4332
;          4333            [9] :
;          4334                WRT_EL (.TST_PAT, .index = 18);     !CALL ROUTINE TO LOAD MLEL
;          4335
;          4336            [10] :
;          4337                WRT_DS (.TST_PAT, .index = 5);      !CALL ROUTINE TO LOAD MLDS
;          4338
;          4339            [11] :
;          4340                WRT_D1 (.TST_PAT, .index = 15);     !CALL ROUTINE TO LOAD MLD1
;          4341
;          4342            [12] :
;          4343                WRT_D2 (.TST_PAT, .index = 16);     !CALL ROUTINE TO LOAD MLD2
;          4344
;          4345            [13] :
;          4346                WRT_D3 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
;          4347            tes;
;          4348
;          4349        end;

                                        .SBTTL  WRT.REG ROUTINE DECLARATION SECTION
025324  004167  157210          WRT.REG:JSR     R1,$SAVE2                       ;                                   4267
025330  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                           4307
025334  016601  000014                  MOV     14(SP),R1                       ; TST.PAT,*
025340  016602  000012                  MOV     12(SP),R2                       ; REG.SEL,*                         4303
025344  006302                          ASL     R2
025346  066207  025352                  ADD     1$(R2),PC
025352  000034                  1$:     .WORD   2$-1$
025354  000050                          .WORD   3$-1$
025356  000066                          .WORD   4$-1$
025360  000104                          .WORD   5$-1$
025362  000122                          .WORD   6$-1$
025364  000140                          .WORD   7$-1$
025366  000156                          .WORD   8$-1$
```

```
7004                                    ;ML4AD
7005                                    ;               ROUTINE DECLARATION SECTION
7006
7007 025370  000174                             .WORD   9$-1$
7008 025372  000212                             .WORD   10$-1$
7009 025374  000230                             .WORD   11$-1$
7010 025376  000246                             .WORD   12$-1$
7011 025400  000264                             .WORD   13$-1$
7012 025402  000302                             .WORD   14$-1$
7013 025404  000320                             .WORD   15$-1$
7014 025406  010146                     2$:     MOV     R1,-(SP)        ;                       4307
7015 025410  005010                             CLR     (R0)
7016 025412  005046                             CLR     -(SP)
7017 025414  004767  174272                     JSR     PC,WRT.CS1
7018 025420  000532                             BR      16$             ;                       4303
7019 025422  010146                     3$:     MOV     R1,-(SP)        ;                       4310
7020 025424  012710  000006                     MOV     #6,(R0)
7021 025430  011046                             MOV     (R0),-(SP)
7022 025432  004767  174432                     JSR     PC,WRT.ER
7023 025436  000523                             BR      16$             ;                       4303
7024 025440  010146                     4$:     MOV     R1,-(SP)        ;                       4313
7025 025442  012710  000003                     MOV     #3,(R0)
7026 025446  011046                             MOV     (R0),-(SP)
7027 025450  004767  174572                     JSR     PC,WRT.DA
7028 025454  000514                             BR      16$             ;                       4303
7029 025456  010146                     5$:     MOV     R1,-(SP)        ;                       4316
7030 025460  012710  000012                     MOV     #12,(R0)
7031 025464  011046                             MOV     (R0),-(SP)
7032 025466  004767  174732                     JSR     PC,WRT.MR
7033 025472  000505                             BR      16$             ;                       4303
7034 025474  010146                     6$:     MOV     R1,-(SP)        ;                       4319
7035 025476  012710  000015                     MOV     #15,(R0)
7036 025502  011046                             MOV     (R0),-(SP)
7037 025504  004767  175300                     JSR     PC,WRT.E1
7038 025510  000476                             BR      16$             ;                       4303
7039 025512  010146                     7$:     MOV     R1,-(SP)        ;                       4322
7040 025514  012710  000016                     MOV     #16,(R0)
7041 025520  011046                             MOV     (R0),-(SP)
7042 025522  004767  175470                     JSR     PC,WRT.E2
7043 025526  000467                             BR      16$             ;                       4303
7044 025530  010146                     8$:     MOV     R1,-(SP)        ;                       4325
7045 025532  012710  000010                     MOV     #10,(R0)
7046 025536  011046                             MOV     (R0),-(SP)
7047 025540  004767  175036                     JSR     PC,WRT.PA
7048 025544  000460                             BR      16$             ;                       4303
7049 025546  010146                     9$:     MOV     R1,-(SP)        ;                       4328
7050 025550  012710  000023                     MOV     #23,(R0)
7051 025554  011046                             MOV     (R0),-(SP)
7052 025556  004767  175666                     JSR     PC,WRT.PD
7053 025562  000451                             BR      16$             ;                       4303
7054 025564  010146                     10$:    MOV     R1,-(SP)        ;                       4331
7055 025566  012710  000021                     MOV     #21,(R0)
7056 025572  011046                             MOV     (R0),-(SP)
7057 025574  004767  176156                     JSR     PC,WRT.EE
7058 025600  000442                             BR      16$             ;                       4303
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

025602  010146                          11$:    MOV     R1,-(SP)                        ;                                4334
025604  012710  000022                          MOV     #22,(R0)
025610  011046                                  MOV     (R0),-(SP)
025612  004767  176076                          JSR     PC,WRT.EL
025616  000433                                  BR      16$                             ;                                4303
025620  010146                          12$:    MOV     R1,-(SP)                        ;                                4337
025622  012710  000005                          MOV     #5,(R0)
025626  011046                                  MOV     (R0),-(SP)
025630  004767  177360                          JSR     PC,WRT.DS
025634  000424                                  BR      16$                             ;                                4303
025636  010146                          13$:    MOV     R1,-(SP)                        ;                                4340
025640  012710  000017                          MOV     #17,(R0)
025644  011046                                  MOV     (R0),-(SP)
025646  004767  176146                          JSR     PC,WRT.D1
025652  000415                                  BR      16$                             ;                                4303
025654  010146                          14$:    MOV     R1,-(SP)                        ;                                4343
025656  012710  000020                          MOV     #20,(R0)
025662  011046                                  MOV     (R0),-(SP)
025664  004767  176442                          JSR     PC,WRT.D2
025670  000406                                  BR      16$                             ;                                4303
025672  010146                          15$:    MOV     R1,-(SP)                        ;                                4346
025674  012710  000016                          MOV     #16,(R0)
025700  011046                                  MOV     (R0),-(SP)
025702  004767  176736                          JSR     PC,WRT.D3
025706  022626                          16$:    CMP     (SP)+,(SP)+                     ;                                4268
025710  000207                                  RTS     PC                              ;                                4267

                                        ; Routine Size:  123 words
                                        ; Maximum stack depth per invocation:  5 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (47)

;          4350  routine RD_REG (TST_PAT, REG_SEL, ERR_FLG) : novalue =
;          4351      begin
;          4352
;          4353  !++
;          4354  ! FUNCTIONAL DESCRIPTION:
;          4355  !       A ROUTINE TO SELECTIVELY
;          4356  !       CALLED ROUTINES WHICH
;          4357  !       READ TO INDIVIDUAL ML11
;          4358  !       REGISTERS.
;          4359  !
;          4360  ! FORMAL PARAMETERS:
;          4361  !       ERR_FLG
;          4362  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          4363  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          4364  !       CALLER TO EXAMINE THE ERROR STATUS
;          4365  !       OF THE ROUTINE CALL.
;          4366  !
;          4367  !       REG_SEL
;          4368  !       CASE SELECT EXPRESSION TO
;          4369  !       SELECT THE WRITE REGISTER
;          4370  !       ROUTINE TO CALLED
;          4371  !
;          4372  !       TST_PAT
;          4373  !       DATA PATTERN WHICH THE SELECTED
;          4374  !       REGISTER WILL BE TESTED AGAINST
;          4375  !
;          4376  !--
;          4377
;          4378      case .REG_SEL from 0 to 13 of              !SELECT THE READ REGISTER ROUTINE CALL
;          4379          set
;          4380
;          4381          [0] :
;          4382              RD_CS1 (.TST_PAT, 0, .ERR_FLG);    !CALL ROOUTINE TO READ MLCS1
;          4383
;          4384          [1] :
;          4385              RD_ER (.TST_PAT, 6, .ERR_FLG);     !CALL ROUTINE TO READ MLER
;          4386
;          4387          [2] :
;          4388              RD_DA (.TST_PAT, 3, .ERR_FLG);     !CALL ROUTINE TO READ MLDA
;          4389
;          4390          [3] :
;          4391              RD_MR (.TST_PAT, 10, .ERR_FLG);    !CALL ROUTINE TO READ MLMR
;          4392
;          4393          [4] :
;          4394              RD_E1 (.TST_PAT, 13, .ERR_FLG);    !CALL ROUTINE TO READ MLE1
;          4395
;          4396          [5] :
;          4397              RD_E2 (.TST_PAT, 14, .ERR_FLG);    !CALL ROUTINE TO READ MLE2
;          4398
;          4399          [6] :
;          4400              RD_PA (.TST_PAT, 8, .ERR_FLG);     !CALL ROUTINE TO READ MLPA
;          4401
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (47)

;                        [7] :
;                            RD_PD (.TST_PAT, 19, .ERR_FLG);     !CALL ROUTINE TO READ MLPD
;
;                        [8] :
;                            RD_EE (.TST_PAT, 17, .ERR_FLG);     !CALL ROUTINE TO READ MLEE
;
;                        [9] :
;                            RD_EL (.TST_PAT, 18, .ERR_FLG);     !CALL ROUTINE TO READ MLEL
;
;                        [10] :
;                            RD_DS (.TST_PAT, 5, .ERR_FLG);      !CALL ROUTINE TO READ MLDS
;
;                        [11] :
;                            RD_D1 (.TST_PAT, 15, .ERR_FLG);     !CALL ROUTINE TO READ MLD1
;
;                        [12] :
;                            RD_D2 (.TST_PAT, 16, .ERR_FLG);     !CALL ROUTINE TO READ MLD2
;
;                        [13] :
;                            RD_D3 (.TST_PAT, 14, .ERR_FLG);     !CALL ROUTINE TO READ MLE2
;                        tes;
;
;                    end;

                                        .SBTTL  RD.REG ROUTINE DECLARATION SECTION
025712  004167  156622          RD.REG: JSR     R1,$SAVE2                       ;                                   4350
025716  016600  000010                  MOV     10(SP),R0                       ; ERR.FLG,*                         4382
025722  016601  000014                  MOV     14(SP),R1                       ; TST.PAT,*
025726  016602  000012                  MOV     12(SP),R2                       ; REG.SEL,*                         4378
025732  006302                          ASL     R2
025734  066207  025740                  ADD     1$(R2),PC
025740  000034                  1$:     .WORD   2$-1$
025742  000050                          .WORD   3$-1$
025744  000066                          .WORD   4$-1$
025746  000104                          .WORD   5$-1$
025750  000122                          .WORD   6$-1$
025752  000140                          .WORD   7$-1$
025754  000156                          .WORD   8$-1$
025756  000174                          .WORD   9$-1$
025760  000212                          .WORD   10$-1$
025762  000230                          .WORD   11$-1$
025764  000246                          .WORD   12$-1$
025766  000264                          .WORD   13$-1$
025770  000302                          .WORD   14$-1$
025772  000320                          .WORD   15$-1$
025774  010146                  2$:     MOV     R1,-(SP)                        ;                                   4382
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

025776  005046                                  CLR     -(SP)
026000  010046                                  MOV     R0,-(SP)
026002  004767  173754                          JSR     PC,RD.CS1
026006  000532                                  BR      16$                     ;                                       4378
026010  010146                          3$:     MOV     R1,-(SP)                ;                                       4385
026012  012746  000006                          MOV     #6,-(SP)
026016  010046                                  MOV     R0,-(SP)
026020  004767  174114                          JSR     PC,RD.ER
026024  000523                                  BR      16$                     ;                                       4378
026026  010146                          4$:     MOV     R1,-(SP)                ;                                       4388
026030  012746  000003                          MOV     #3,-(SP)
026034  010046                                  MOV     R0,-(SP)
026036  004767  174254                          JSR     PC,RD.DA
026042  000514                                  BR      16$                     ;                                       4378
026044  010146                          5$:     MOV     R1,-(SP)                ;                                       4391
026046  012746  000012                          MOV     #12,-(SP)
026052  010046                                  MOV     R0,-(SP)
026054  004767  174414                          JSR     PC,RD.MR
026060  000505                                  BR      16$                     ;                                       4378
026062  010146                          6$:     MOV     R1,-(SP)                ;                                       4394
026064  012746  000015                          MOV     #15,-(SP)
026070  010046                                  MOV     R0,-(SP)
026072  004767  174776                          JSR     PC,RD.E1
026076  000476                                  BR      16$                     ;                                       4378
026100  010146                          7$:     MOV     R1,-(SP)                ;                                       4397
026102  012746  000016                          MOV     #16,-(SP)
026106  010046                                  MOV     R0,-(SP)
026110  004767  175200                          JSR     PC,RD.E2
026114  000467                                  BR      16$                     ;                                       4378
026116  010146                          8$:     MOV     R1,-(SP)                ;                                       4400
026120  012746  000010                          MOV     #10,-(SP)
026124  010046                                  MOV     R0,-(SP)
026126  004767  174534                          JSR     PC,RD.PA
026132  000460                                  BR      16$                     ;                                       4378
026134  010146                          9$:     MOV     R1,-(SP)                ;                                       4403
026136  012746  000023                          MOV     #23,-(SP)
026142  010046                                  MOV     R0,-(SP)
026144  004767  175406                          JSR     PC,RD.PD
026150  000451                                  BR      16$                     ;                                       4378
026152  010146                          10$:    MOV     R1,-(SP)                ;                                       4406
026154  012746  000021                          MOV     #21,-(SP)
026160  010046                                  MOV     R0,-(SP)
026162  004767  175572                          JSR     PC,RD.EE
026166  000442                                  BR      16$                     ;                                       4378
026170  010146                          11$:    MOV     R1,-(SP)                ;                                       4409
026172  012746  000022                          MOV     #22,-(SP)
026176  010046                                  MOV     R0,-(SP)
026200  004767  175512                          JSR     PC,RD.EL
026204  000433                                  BR      16$                     ;                                       4378
026206  010146                          12$:    MOV     R1,-(SP)                ;                                       4412
026210  012746  000005                          MOV     #5,-(SP)
026214  010046                                  MOV     R0,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<

026216  004767  176774                          JSR     PC,RD.DS
026222  000424                                  BR      16$                     ;                                       4378
026224  010146                          13$:    MOV     R1,-(SP)                ;                                       4415
026226  012746  000017                          MOV     #17,-(SP)
026232  010046                                  MOV     R0,-(SP)
026234  004767  175644                          JSR     PC,RD.D1
026240  000415                                  BR      16$                     ;                                       4378
026242  010146                          14$:    MOV     R1,-(SP)                ;                                       4418
026244  012746  000020                          MOV     #20,-(SP)
026250  010046                                  MOV     R0,-(SP)
026252  004767  176140                          JSR     PC,RD.D2
026256  000406                                  BR      16$                     ;                                       4378
026260  010146                          15$:    MOV     R1,-(SP)                ;                                       4421
026262  012746  000016                          MOV     #16,-(SP)
026266  010046                                  MOV     R0,-(SP)
026270  004767  176450                          JSR     PC,RD.D3
026274  062706  000006                  16$:    ADD     #6,SP                   ;                                       4351
026300  000207                                  RTS     PC                      ;                                       4350

                                        ; Routine Size:  124 words
                                        ; Maximum stack depth per invocation:  6 words


;           4425  !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (48)

;          4426                                         !
;          4427  !
;          4428  BGNMSG (DUMPER);

                                        .SBTTL  DUMPER ROUTINE DECLARATION SECTION
  302  004767  000004          DUMPER::JSR     PC,MSDUMPER                     ;                       4428
026306  104423                  TRAP    23
026310  000207                  RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words

;          4429
;          4430  !++
;          4431  !       FUNCTIONAL DESCRIPTION
;          4432  !               UPON COMPLETION OF ERROR MESSAGES
;          4433  !               DUMP OUT ALL PERTINENT DRIVE AND
;          4434  !               RH REGISTERS
;          4435  !--
;          4436
;          4437  if .REGDMP
;          4438  then
;          4439      begin
;          4440      PRINTB (ONE_FMT, PHR_14);                 !PRINT REGISTER DUMP MESSAGE
;          4441      PRINTB (FMT_23);                          !PRINT DUMPER COLUMN HEADINGS
;          4442      PRINTB (FMT_24, REG_1, MLCS1, .MLCS1);    !PRINT OUT THE RH & ML11 REGISTER CONTENTS
;          4443      PRINTB (FMT_24, REG_18, MLWC, .MLWC);
;          4444      PRINTB (FMT_24, REG_19, MLBA, .MLBA);
;          4445      PRINTB (FMT_24, REG_6, MLDA, .MLDA);
;          4446      PRINTB (FMT_24, REG_17, MLCS2, .MLCS2);
;          4447      PRINTB (FMT_24, REG_2, MLDS, .MLDS);
;          4448      PRINTB (FMT_24, REG_3, MLER, .MLER);
;          4449      PRINTB (FMT_24, REG_5, MLAS, .MLAS);
;          4450      PRINTB (FMT_24, REG_4, MLMR, .MLMR);
;          4451      PRINTB (FMT_24, REG_7, MLDT, .MLDT);
;          4452      PRINTB (FMT_24, REG_9, MLSN, .MLSN);
;          4453      PRINTB (FMT_24, REG_14, MLEE, .MLEE);
;          4454      PRINTB (FMT_24, REG_15, MLEL, .MLEL);
;          4455
;          4456      if .LST_DUT_REG eql 21                    !SEE IF THIS IS A RH70
;          4457      then                                      !IF YES THEN PRINT RH70 REGISTERS
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (48)
;ML4AD
;                ROUTINE DECLARATION SECTION
;
;          4458          begin
;          4459          PRINTB (FMT_24, REG_20, MLBAE, .MLBAE);
;          4460          PRINTB (FMT_24, REG_21, MLCS3, .MLCS3);
;          4461          end;
;          4462
;          4463      end;
;          4464
;          4465  ENDMSG;
                                        .SBTTL  MSDUMPER ROUTINE DECLARATION SECTION
026312                          MSDUMPER:
026312  032767  000001  154064          BIT     #1,REGDMP                       ;                       4437
026320  001001                          BNE     1$
026322  000207                          RTS     PC
026324  012746  012104          1$:     MOV     #PHR.14,-(SP)                   ;                       4440
026330  012746  010240                  MOV     #ONE.FMT,-(SP)
026334  012746  000002                  MOV     #2,-(SP)
026340  010600                          MOV     SP,R0                           ; SP,*
026342  104414                          TRAP    14
026344  012716  010072                  MOV     #FMT.23,(SP)                    ;                       4441
026350  012746  000C01                  MOV     #1,-(SP)
026354  010600                          MOV     SP,R0                           ; SP,*
026356  104414                          TRAP    14
026360  017716  167020                  MOV     @ML.REG,(SP)                    ;                       4442
026364  016746  167014                  MOV     ML.REG,-(SP)
026370  012746  012500                  MOV     #REG.1,-(SP)
026374  012746  010142                  MOV     #FMT.24,-(SP)
026400  012746  000004                  MOV     #4,-(SP)
026404  010600                          MOV     SP,R0                           ; SP,*
026406  104414                          TRAP    14
026410  017716  167000                  MOV     @ML.REG+10,(SP)                 ;                       4443
026414  016746  166774                  MOV     ML.REG+10,-(SP)
026420  012746  012652                  MOV     #REG.18,-(SP)
026424  012746  010142                  MOV     #FMT.24,-(SP)
026430  012746  000004                  MOV     #4,-(SP)
026434  010600                          MOV     SP,R0                           ; SP,*
026436  104414                          TRAP    14
026440  017716  166760                  MOV     @ML.REG+20,(SP)                 ;                       4444
026444  016746  166754                  MOV     ML.REG+20,-(SP)
026450  012746  012660                  MOV     #REG.19,-(SP)
026454  012746  010142                  MOV     #FMT.24,-(SP)
026460  012746  000004                  MOV     #4,-(SP)
026464  010600                          MOV     SP,R0                           ; SP,*
026466  104414                          TRAP    14
026470  017716  166740                  MOV     @ML.REG+30,(SP)                 ;                       4445
026474  016746  166734                  MOV     ML.REG+30,-(SP)
```

```
                                                                                                                    29-Mar-1982 16:23:04    TOPS
                                                                                                                    29-Mar-1982 16:21:03    PA:<
7411                                        ;ML4AD
7412                                        ;                   ROUTINE DECLARATION SECTION
7413
7414 026500 012746 012540                           MOV     #REG.6,-(SP)
7415 026504 012746 010142                           MOV     #FMT.24,-(SP)
7416 026510 012746 000004                           MOV     #4,-(SP)
7417 026514 010600                                  MOV     SP,R0                   ; SP,*
7418 026516 104414                                  TRAP    14
7419 026520 017716 166720                           MOV     @ML.REG+40,(SP)         ;                                                   4446
7420 026524 016746 166714                           MOV     ML.REG+40,-(SP)
7421 026530 012746 012642                           MOV     #REG.17,-(SP)
7422 026534 012746 010142                           MOV     #FMT.24,-(SP)
7423 026540 012746 000004                           MOV     #4,-(SP)
7424 026544 010600                                  MOV     SP,R0                   ; SP,*
7425 026546 104414                                  TRAP    14
7426 026550 017716 166700                           MOV     @ML.REG+50,(SP)         ;                                                   4447
7427 026554 016746 166674                           MOV     ML.REG+50,-(SP)
7428 026560 012746 012510                           MOV     #REG.2,-(SP)
7429 026564 012746 010142                           MOV     #FMT.24,-(SP)
7430 026570 012746 000004                           MOV     #4,-(SP)
7431 026574 010600                                  MOV     SP,R0                   ; SP,*
7432 026576 104414                                  TRAP    14
7433 026600 017716 166660                           MOV     @ML.REG+60,(SP)         ;                                                   4448
7434 026604 016746 166654                           MOV     ML.REG+60,-(SP)
7435 026610 012746 012516                           MOV     #REG.3,-(SP)
7436 026614 012746 010142                           MOV     #FMT.24,-(SP)
7437 026620 012746 000004                           MOV     #4,-(SP)
7438 026624 010600                                  MOV     SP,R0                   ; SP,*
7439 026626 104414                                  TRAP    14
7440 026630 017716 166640                           MOV     @ML.REG+70,(SP)         ;                                                   4449
7441 026634 016746 166634                           MOV     ML.REG+70,-(SP)
7442 026640 012746 012532                           MOV     #REG.5,-(SP)
7443 026644 012746 010142                           MOV     #FMT.24,-(SP)
7444 026650 012746 000004                           MOV     #4,-(SP)
7445 026654 010600                                  MOV     SP,R0                   ; SP,*
7446 026656 104414                                  TRAP    14
7447 026660 017716 166640                           MOV     @ML.REG+120,(SP)        ;                                                   4450
7448 026664 016746 166634                           MOV     ML.REG+120,-(SP)
7449 026670 012746 012524                           MOV     #REG.4,-(SP)
7450 026674 012746 010142                           MOV     #FMT.24,-(SP)
7451 026700 012746 000004                           MOV     #4,-(SP)
7452 026704 010600                                  MOV     SP,R0                   ; SP,*
7453 026706 104414                                  TRAP    14
7454 026710 017716 166620                           MOV     @ML.REG+130,(SP)        ;                                                   4451
7455 026714 016746 166614                           MOV     ML.REG+130,-(SP)
7456 026720 012746 012546                           MOV     #REG.7,-(SP)
7457 026724 012746 010142                           MOV     #FMT.24,-(SP)
7458 026730 012746 000004                           MOV     #4,-(SP)
7459 026734 010600                                  MOV     SP,R0                   ; SP,*
7460 026736 104414                                  TRAP    14
7461 026740 017716 166600                           MOV     @ML.REG+140,(SP)        ;                                                   4452
7462 026744 016746 166574                           MOV     ML.REG+140,-(SP)
7463 026750 012746 012562                           MOV     #REG.9,-(SP)
7464 026754 012746 010142                           MOV     #FMT.24,-(SP)
7465 026760 012746 000004                           MOV     #4,-(SP)
```

```
                                                                                                                    29-Mar-1982 16:23:04    TOPS
                                                                                                                    29-Mar-1982 16:21:03    PA:<
                                        ;ML4AD
                                        ;                       ROUTINE DECLARATION SECTION
7470 026764  010600                            MOV     SP,R0                           ; SP,*
7471 026766  104414                            TRAP    14
7472 026770  017716  166620                    MOV     @ML.REG+210,(SP)                ;                                                       4453
7473 026774  016746  166614                    MOV     ML.REG+210,-(SP)
7474 027000  012746  012620                    MOV     #REG.14,-(SP)
7475 027004  012746  010142                    MOV     #FMT.24,-(SP)
7476 027010  012746  000004                    MOV     #4,-(SP)
7477 027014  010600                            MOV     SP,R0                           ; SP,*
7478 027016  104414                            TRAP    14
7479 027020  062706  000146                    ADD     #146,SP
7480 027024  017716  166574                    MOV     @ML.REG+220,(SP)                ;                                                       4454
7481 027030  016746  166570                    MOV     ML.REG+220,-(SP)
7482 027034  012746  012626                    MOV     #REG.15,-(SP)
7483 027040  012746  010142                    MOV     #FMT.24,-(SP)
7484 027044  012746  000004                    MOV     #4,-(SP)
7485 027050  010600                            MOV     SP,R0                           ; SP,*
7486 027052  104414                            TRAP    14
7487 027054  026727  166276  000025            CMP     LST.DUT.REG,#25                 ;                                                       4456
7488 027062  001032                            BNE     2$                                                                                      4459
7489 027064  017746  166554                    MOV     @ML.REG+240,-(SP)               ;
7490 027070  016746  166550                    MOV     ML.REG+240,-(SP)
7491 027074  012746  012666                    MOV     #REG.20,-(SP)
7492 027100  012746  010142                    MOV     #FMT.24,-(SP)
7493 027104  012746  000004                    MOV     #4,-(SP)
7494 027110  010600                            MOV     SP,R0                           ; SP,*
7495 027112  104414                            TRAP    14
7496 027114  017716  166534                    MOV     @ML.REG+250,(SP)                ;                                                       4460
7497 027120  016746  166530                    MOV     ML.REG+250,-(SP)
7498 027124  012746  012676                    MOV     #REG.21,-(SP)
7499 027130  012746  010142                    MOV     #FMT.24,-(SP)
7500 027134  012746  000004                    MOV     #4,-(SP)
7501 027140  010600                            MOV     SP,R0                           ; SP,*
7502 027142  104414                            TRAP    14
7503 027144  062706  000022                    ADD     #22,SP                          ;                                                       4458
7504 027150  062706  000012            2$:     ADD     #12,SP                          ;                                                       4439
7505 027154  000207                            RTS     PC                              ;                                                       4428
7506
7507                                    ; Routine Size:  210 words
7508                                    ; Maximum stack depth per invocation:  52 words
7513
7514
```

```
4466  routine WRT_CHK_TRANSFER (SIZE, DST, SRC) : novalue =
4467      begin
4468
4469  !++
4470  !  FUNCTIONAL DESCRIPTION:
4471  !       THIS ROUTINE WHEN CALLED WILL PERFORM
4472  !       A MASS BUS WRITE CHECK TRANSFER TO THE REQUESTED
4473  !       DESTINATION AND SOURCE ADDRESS OF LENGTH
4474  !       'SIZE'.
4475  !
4476  !  FORMAL PARAMETERS:
4477  !       SIZE:   DETERMINES THE NUMBER OF WORDS TO
4478  !               TRANSFER TO THE DESTINATION ADRS.
4479  !
4480  !       DST:    DETERMINES THE DESTINATION ADRS OF
4481  !               TRANSFER.
4482  !
4483  !       SRC:    DETERMINES THE SOURCE ADRS OF THE
4484  !               TRANSFER.
4485  !
4486  !--
4487
4488      CLR_MBUS;                           !CLEAR THE MASS BUS BEFORE WE START
4489      ECC_DIS = ONE;                      !DISABLE ERROR CORRECTION
4490      BAI = ONE;                          !MAKE THE TRANSFER STAY ON ONE BUS ADRS
4491      MLWC = .SIZE;                       !LOAD THE SIZE OF THE TRANSFER
4492      MLDA = .DST;                        !LOAD THE DESTINATION ADRS OF THE TRANSFER
4493      MLBA = .SRC;                        !LOAD THE SOURCE ADRS OF THE TRANSFER
4494      MLCS1 = WRT_CHK;                    !LOAD THE WRITE CHECK FUNCTION INTO CS1
4495
4496      if (.SC) and ( not .WCE)            !DID LOADING THE FUNCTION CAUSE A SC ERROR
4497      then
4498          begin
4499          ERRDF (148, INTER, DUMPER);     !REPORT THE ERROR TO OPERATOR
4500          PRINTB (ONE_FMT, WC_ERR);       !TELL WHAT THE ERROR IS
4501          DODU (.ML_LUN);                 !DROP THE UNIT
4502          DOCLN;                          !EXIT THE PROG
4503          end;
4504
4505      do                                  !DO NOTHING
4506          0
4507      until .DRY;                         !UNTIL THE DRIVE IS READY
4508
4509      if (.SC) and ( not .WCE)            !DID THE SC BIT SET DURING THE XFER
4510      then
4511          begin
4512          ERRDF (148, INTER, DUMPER);     !REPORT THE ERROR TO OPERATOR
4513          PRINTB (ONE_FMT, WC_ERR);       !TELL WHAT THE ERROR IS
4514          DODU (.ML_LUN);                 !DROP THE UNIT
4515          DOCLN;                          !EXIT THE PROGRAM
4516          end;
4517
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (49)
7572 ;ML4AD
7573 ;                  ROUTINE DECLARATION SECTION
7574
7575 ;          4518       end;
7579
7580                                                    .SBTTL  WRT.CHK.TRANSFE ROUTINE DECLARATION SECTION
7584 027156                                     WRT.CHK.TRANSFE:
7585 027156  152777  000040  166260                    BISB    #40,@ML.REG+40                  ;                       4467
7586 027164  016700  166642                            MOV     ML.DUT,R0
7587 027170  042700  177770                            BIC     #177770,R0
7588 027174  142777  000007  166242                    BICB    #7,@ML.REG+40
7589 027202  150077  166236                            BISB    R0,@ML.REG+40
7590 027206  152777  000002  166310                    BISB    #2,@ML.REG+120                  ;                       4489
7591 027214  152777  000010  166222                    BISB    #10,@ML.REG+40                  ;                       4490
7592 027222  016677  000006  166164                    MOV     6(SP),@ML.REG+10                ; SIZE,*                4491
7593 027230  016677  000004  166176                    MOV     4(SP),@ML.REG+30                ; DST,*                 4492
7594 027236  016677  000002  166160                    MOV     2(SP),@ML.REG+20                ; SRC,*                 4493
7595 027244  012777  000051  166132                    MOV     #51,@ML.REG                     ;                       4494
7596 027252  005777  166126                            TST     @ML.REG                         ;                       4496
7597 027256  100026                                    BPL     1$
7598 027260  032777  040000  166156                    BIT     #40000,@ML.REG+40
7599 027266  001022                                    BNE     1$
7600 027270  104455                                    TRAP    55                              ;                       4499
7601 027272  000224                                    .WORD   224
7602 027274  013114                                    .WORD   INTER
7603 027276  026302                                    .WORD   DUMPER
7604 027300  012746  005652                            MOV     #WC.ERR,-(SP)                   ;                       4500
7605 027304  012746  010240                            MOV     #ONE.FMT,-(SP)
7606 027310  012746  000002                            MOV     #2,-(SP)
7607 027314  010600                                    MOV     SP,R0                           ; SP,*
7608 027316  104414                                    TRAP    14
7609 027320  016700  166504                            MOV     ML.LUN,R0                       ;                       4501
7610 027324  104451                                    TRAP    51
7611 027326  104444                                    TRAP    44
7612 027330  062706  000006                            ADD     #6,SP                           ;                       4498
7613 027334  105777  166114                     1$:    TSTB    @ML.REG+50                      ;                       4507
7614 027340  100375                                    BPL     1$
7615 027342  005777  166036                            TST     @ML.REG                         ;                       4509
7616 027346  100026                                    BPL     2$
7617 027350  032777  040000  166066                    BIT     #40000,@ML.REG+40
7618 027356  001022                                    BNE     2$
7619 027360  104455                                    TRAP    55                              ;                       4512
7620 027362  000224                                    .WORD   224
7621 027364  013114                                    .WORD   INTER
7622 027366  026302                                    .WORD   DUMPER
7623 027370  012746  005652                            MOV     #WC.ERR,-(SP)                   ;                       4513
7624 027374  012746  010240                            MOV     #ONE.FMT,-(SP)
7625 027400  012746  000002                            MOV     #2,-(SP)
7626 027404  010600                                    MOV     SP,R0                           ; SP,*
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
                                        
027406  104414                                  TRAP    14
027410  016700  166414                          MOV     ML.LUN,R0               ;               4514
027414  104451                                  TRAP    51
027416  104444                                  TRAP    44
027420  062706  000006                          ADD     #6,SP                   ;               4511
027424  000207                        2$:       RTS     PC                      ;               4466
                                        
                                        ; Routine Size:  84 words
                                        ; Maximum stack depth per invocation:  3 words
                                        
                                        
```

```
7647 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
7648 ;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (50)
7649 ;
7650 ;          4519  routine WRT_TRANSFER (SIZE, DST, SRC) : novalue =
7651 ;          4520      begin
7652 ;          4521
7653 ;          4522  !++
7654 ;          4523  !   FUNCTIONAL DESCRIPTION
7655 ;          4524  !        THIS ROUTINE WHEN CALLED WILL PERFORM
7656 ;          4525  !        A WRITE TRANSFER TO THE REQUESTED
7657 ;          4526  !        DESTINATION AND SOURCE ADDRESSES OF
7658 ;          4527  !        LENGTH 'SIZE'.
7659 ;          4528  !
7660 ;          4529  !   FORMAL PARAMETERS:
7661 ;          4530  !        SIZE:   DETERMINES THE NUMBER OF WORDS
7662 ;          4531  !                TO TRANSFER.
7663 ;          4532  !        DST:    DETERMINES THE DESTINATION ADRS
7664 ;          4533  !                OF THE TRANSFER.
7665 ;          4534  !        SRC:    DETERMINES THE SOURCE ADRS OF THE
7666 ;          4535  !                TRANSFER.
7667 ;          4536  !--
7668 ;          4537
7669 ;          4538      CLR_MBUS;                            !CLEAR THE MASS BUS BEFORE WE START
7670 ;          4539      BAI = ONE;                           !FORCE THE TRANSFER TO STAY ON ONE BUS ADRS
7671 ;          4540      MLWC = .SIZE;                        !LOAD THE WORD COUNT SIZE
7672 ;          4541      MLDA = .DST;                         !LOAD THE DESTINATION ADRS
7673 ;          4542      MLBA = .SRC;                         !LOAD THE SOURCE ADRS
7674 ;          4543      MLCS1 = write;                       !LOAD THE FUNCTION INTO CS1
7675 ;          4544
7676 ;          4545      if .SC                               !DID LOADING THE FUNCTION CAUSE AN SC ERROR
7677 ;          4546      then
7678 ;          4547          begin
7679 ;          4548          ERRDF (148, INTER, DUMPER);      !REPORT THE ERROR
7680 ;          4549          PRINTB (ONE_FMT, W_ERR);         !TELL WHAT THE ERROR IS
7681 ;          4550          DODU (.ML_LUN);                  !DROP THE UNIT
7682 ;          4551          DOCLN;                           !EXIT THE PROGRAM
7683 ;          4552          end;
7684 ;          4553
7685 ;          4554      do                                   !DO NOTHING
7686 ;          4555          0                                !
7687 ;          4556      until .DRY;                          !UNTIL THE DRIVE IS READY
7688 ;          4557
7689 ;          4558      if .SC                               !DID SC ERROR SET DURING THE TRANSFER
7690 ;          4559      then
7691 ;          4560          begin
7692 ;          4561          ERRDF (148, INTER, DUMPER);      !REPORT THE ERORR
7693 ;          4562          PRINTB (ONE_FMT, W_ERR);         !TELL WHAT THE ERROR IS
7694 ;          4563          DODU (.ML_LUN);                  !DROP THE UNIT
7695 ;          4564          DOCLN;                           !EXIT THE PROGRAM
7696 ;          4565          end;
7697 ;          4566
7698 ;          4567      end;
```

```
                                        ;ML4AD
                                        ;               ROUTINE DECLARATION SECTION

                                                .SBTTL  WRT.TRANSFER ROUTINE DECLARATION SECTION
027426                                  WRT.TRANSFER:
027426  152777  000040  166010                  BISB    #40,@ML.REG+40                  ;                       4520
027434  016700  166372                          MOV     ML.DUT,R0
027440  042700  177770                          BIC     #177770,R0
027444  142777  000007  165772                  BICB    #7,@ML.REG+40
027452  150077  165766                          BISB    R0,@ML.REG+40
027456  152777  000010  165760                  BISB    #10,@ML.REG+40                  ;                       4539
027464  016677  000006  165722                  MOV     6(SP),@ML.REG+10                ; SIZE,*                4540
027472  016677  000004  165734                  MOV     4(SP),@ML.REG+30                ; DST,*                 4541
027500  016677  000002  165716                  MOV     2(SP),@ML.REG+20                ; SRC,*                 4542
027506  012777  000061  165670                  MOV     #61,@ML.REG                     ;                       4543
027514  005777  165664                          TST     @ML.REG                         ;                       4545
027520  100022                                  BPL     1$
027522  104455                                  TRAP    55                              ;                       4548
027524  000224                                  .WORD   224
027526  013114                                  .WORD   INTER
027530  026302                                  .WORD   DUMPER
027532  012746  005722                          MOV     #W.ERR,-(SP)                    ;                       4549
027536  012746  010240                          MOV     #ONE.FMT,-(SP)
027542  012746  000002                          MOV     #2,-(SP)
027546  010600                                  MOV     SP,R0                           ; SP,*
027550  104414                                  TRAP    14
027552  016700  166252                          MOV     ML.LUN,R0                       ;                       4550
027556  104451                                  TRAP    51
027560  104444                                  TRAP    44
027562  062706  000006                          ADD     #6,SP                           ;                       4547
027566  105777  165662                  1$:     TSTB    @ML.REG+50                      ;                       4556
027572  100375                                  BPL     1$
027574  005777  165604                          TST     @ML.REG                         ;                       4558
027600  100022                                  BPL     2$
027602  104455                                  TRAP    55                              ;                       4561
027604  000224                                  .WORD   224
027606  013114                                  .WORD   INTER
027610  026302                                  .WORD   DUMPER
027612  012746  005722                          MOV     #W.ERR,-(SP)                    ;                       4562
027616  012746  010240                          MOV     #ONE.FMT,-(SP)
027622  012746  000002                          MOV     #2,-(SP)
027626  010600                                  MOV     SP,R0                           ; SP,*
027630  104414                                  TRAP    14
027632  016700  166172                          MOV     ML.LUN,R0                       ;                       4563
027636  104451                                  TRAP    51
027640  104444                                  TRAP    44
027642  062706  000006                          ADD     #6,SP                           ;                       4560
027646  000207                          2$:     RTS     PC                              ;                       4519

                                        ; Routine Size:  73 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;           ROUTINE DECLARATION SECTION  29-Mar-1982 16:21:03    PA:<
;          4568  !<BLF/PAGE>
```

```
7770 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
7771 ;                  INITIALIZATION CODE SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (52)
7772 ;
7773 ;          4569  %sbttl 'INITIALIZATION CODE SECTION'
7774 ;          4570  !
7775 ;          4571  !
7776 ;          4572  BGNINIT;
7777 ;          4573  !       INITIALIZATION CODE IS EXECUTED AT THE BEGINNING OF EACH
7778 ;          4574  !       PASS, WHEN POWER DOWN/POWER UP HAS OCCURRED, OR WHEN THE
7779 ;          4575  !       OPERATOR HAS ISSUED A START, RESTART OR CONTINUE COMMAND.
7780 ;          4576  !       DURING INITIALIZATION, THE 'GPHARD' MACRO IS USED TO GET
7781 ;          4577  !       P-TABLE INFORMATION FOR THE LOGICAL UNIT UNDER TEST. THE
7782 ;          4578  !       NUMBER OF UNITS  AVAILABLE FOR TESTING IS CONTAINED IN A
7783 ;          4579  !       HEADER LOCATION ('L$UNIT').
7784 ;          4580
7785 ;          4581  local
7786 ;          4582      OFFSET;
7787 ;          4583
7788 ;          4584  external
7789 ;          4585      L$UNIT;
7790 ;          4586
7791 ;          4587  if not READEF (EF_CONTINUE)                    !SKIP INIT CODE IF CONTINUE
7792 ;          4588  then
7793 ;          4589      begin                                      !START GPHARDS AT LUN 0 AND LOAD 'ML_REG'
7794 ;          4590
7795 ;          4591      if READEF (EF_START)                       !SEE IF THIS IS THE VERY FIRST PASS
7796 ;          4592      then
7797 ;          4593          begin                                  !THIS IS CATEGORY 1 CODE
7798 ;          4594          ML_LUN = -1;
7799 ;          4595          DROP_CNT = ZERO;                       !CLEAR THE PASS COUNTER
7800 ;          4596
7801 ;          4597          do
7802 ;          4598              begin
7803 ;          4599              ML_LUN = .ML_LUN + 1;              !INCREMENT LOGICAL UNIT NUMBER
7804 ;          4600
7805 ;          4601              if .ML_LUN geq .L$UNIT then DOCLN; !START OVER IF ALL UNITS HAVE BEEN TESTED
7806 ;          4602
7807 ;          4603              end
7808 ;          4604          until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;       !REPEAT THE GPHARD UNTIL A 0 IS RETURNED
7809 ;          4605
7810 ;          4606          RH_ADD = .((.PTBL_PTR) + 0);           !GET BASE RH ADDRESS FOR THIS UNIT
7811 ;          4607          RH_TYP = .((.PTBL_PTR) + 2);           !GET RH TYPE FOR THIS UNIT
7812 ;          4608          RH_VEC = .((.PTBL_PTR) + 4);           !GET RH VECTOR FOR THIS UNIT
7813 ;          4609          OFFSET = 0;                            !INIT OFF SET COUNT
7814 ;          4610
7815 ;          4611          incr COUNT from 0 to 21 do             !LOAD THE REGISTER ADDRESS FOR THIS UNIT INTO ML_REG
7816 ;          4612              begin
7817 ;          4613              ML_REG [.COUNT, REGISTER_ADD] = .RH_ADD + .OFFSET;
7818 ;          4614              OFFSET = .OFFSET + 2;
7819 ;          4615              end;
7820 ;          4616
7821 ;          4617          end
7822 ;          4618      else                                       !IS THIS A NEW PASS
7823 ;          4619          begin
7824 ;          4620
```

```
7826 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
7827 ;                INITIALIZATION CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (52)
7828 ;
7829 ;          4621          if READEF (EF_RESTART) then DROP_CNT = -1;      !RESET THE PASS COUNTER
7830 ;          4622
7831 ;          4623          if READEF (EF_NEW)                      !IS THIS A NEW PASS
7832 ;          4624          then
7833 ;          4625              begin                               !THIS IS A NEW PASS
7834 ;          4626              DROP_CNT = .DROP_CNT + 1;           !INCREMENT THE PASS COUNT
7835 ;          4627
7836 ;          4628              if (.ONEPAS) and (.DROP_CNT eql 1)  !HAVE WE DONE ONE PASS YET
7837 ;          4629              then
7838 ;          4630                  begin                           !DROP THE UNIT ON THE SECOND PASS
7839 ;          4631                  DODU (.ML_LUN);                 !DROP THE UNIT
7840 ;          4632                  DOCLN;                          !JUMP TO THE CLEAN UP CODE
7841 ;          4633                  end
7842 ;          4634              else                                !THE FIRST PASS IS NOT COMPLETED YET
7843 ;          4635                  ML_LUN = -1;                    !RESET THE LUN POINTER
7844 ;          4636
7845 ;          4637              end;
7846 ;          4638
7847 ;          4639          do
7848 ;          4640              begin
7849 ;          4641              ML_LUN = .ML_LUN + 1;               !IF NOT GET NEXT LUN PTABLE
7850 ;          4642
7851 ;          4643              if .ML_LUN geq .LSUNIT then DOCLN;  !START OVER IF ALL UNITS ARE TESTED
7852 ;          4644
7853 ;          4645              end
7854 ;          4646          until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;       !REPEAT UNTIL A 0 IS RETURNED
7855 ;          4647
7856 ;          4648          end;
7857 ;          4649
7858 ;          4650      PAR_DIS = .((.PTBL_PTR) + 12);              !GET PARITY DISABLE FLAG
7859 ;          4651      ML_DUT = .((.PTBL_PTR) + 10);               !GET DRIVE NUMBER
7860 ;          4652      OP_NUM_ARR = .((.PTBL_PTR) + 6) - 1;        !GET OPERATOR NUMBER OF ARRAYS
7861 ;          4653      GOOD_BLK = ZEROES;                          !INIT GOOD BLOCK TO BLOCK ZERO
7862 ;          4654      ARR_T6 = ZEROES;                            !INIT ARRAY 16 TO ZERO
7863 ;          4655      LST_ARR = ZEROES;                           !INIT LAST ARRAY TO ZERO
7864 ;          4656      LST_BLK = ZEROES;                           !INIT LAST BLOCK TO ZERO
7865 ;          4657  !
7866 ;          4658  ! DEFINE ERROR PRINTING THRESHOLD LIMIT
7867 ;          4659  !
7868 ;          4660
7869 ;          4661      if .ERRTHR then LIMIT = 10 else LIMIT = %o'077777';
7870 ;          4662
7871 ;          4663  !
7872 ;          4664  ! CALCULATE THE MOS RAM SIZE RUN TIME
7873 ;          4665  ! PARAMETERS. 'EITHER 16K OR 64K''
7874 ;          4666  !
7875 ;          4667
7876 ;          4668      if .((.PTBL_PTR) + 8) IS_SET                !CALCULATE ML11 16K MOS RAM PARAMETERS
7877 ;          4669      then
7878 ;          4670          begin
7879 ;          4671          DRIVE_TYPE = %o'000110';                !EXPECTED DRIVE TYPE VALUE
7880 ;          4672          W_C_SIZE = %o'140000';                  !WORD COUNT SIZE FOR 16K WORD XFER
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                INITIALIZATION CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (52)
;
;          4673          RAS_INC = %o'200';                !RAS INCREMENT FOR 16K RAMS
;          4674          CHIP_SIZ = 16;                    !CHIP SIZE
;          4675          ARR_INC = %o'1000';               !ARRAY INCREMENT
;          4676          ARR_16<9, 4> = %o'17';            !ARRAY 16
;          4677          LST_ARR<9, 4> = .OP_NUM_ARR;      !LAST ARRAY
;          4678          LST_BLK<9, 4> = .OP_NUM_ARR;      !LAST BLOCK
;          4679          LST_BLK = .LST_BLK or %o'777';
;          4680          end
;          4681      else                                  !CALCULATE ML11 64K MOS RAM PARAMETERS
;          4682          begin
;          4683          DRIVE_TYPE = %o'000111';          !EXPECTED DRIVE TYPE VALUE
;          4684          W_C_SIZE = %o'000000';            !WORD COUNT SIZE FOR 64K WORD XFER
;          4685          RAS_INC = %o'1000';               !RAS INCREMENT FOR 64K RAMS
;          4686          CHIP_SIZ = 64;                    !CHIP SIZE
;          4687          ARR_INC = %o'4000';               !ARRAY INCREMENT
;          4688      !
;          4689      ! VERSION CZMLAD CHANGED %O'37' TO %O'17'
;          4690      !
;          4691          ARR_16<11, 4> = %o'17';           !ARRAY 16
;          4692          LST_ARR<11, 4> = .OP_NUM_ARR;     !LAST ARRAY
;          4693          LST_BLK<11, 4> = .OP_NUM_ARR;     !LAST BLOCK
;          4694          LST_BLK = .LST_BLK or %o'3777';
;          4695          end;
;          4696
;          4697      if .((.PTBL_PTR) + 2) eql %o'70' then LST_DUT_REG = 21 else LST_DUT_REG = 19;
;          4698
;          4699      PRINTB (FMT_17, .ML_LUN);             !TELL OPERATOR WHICH UNIT IS BEING TESTED
;          4700      CLR_MBUS;                             !CLEAR MASS BUS
;          4701      end;
;          4702
;          4703  ENDINIT;
;
                                    .GLOBL  L$UNIT
;
;
                                    .SBTTL  LINIT INITIALIZATION CODE SECTION
027650  004167  154700          LINIT:  JSR     R1,$SAVE3                       ;                       4567
027654  012700  000036                  MOV     #36,R0                          ;                       4587
027660  104447                          TRAP    47
027662  103001                          BHIS    1$
027664  000207                          RTS     PC
027666  012700  000040          1$:     MOV     #40,R0                          ;                       4591
027672  104447                          TRAP    47
027674  103063                          BHIS    5$
027676  012767  177777  166124          MOV     #-1,ML.LUN                      ;                       4594
027704  005067  165472                  CLR     DROP.CNT                        ;                       4595
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               INITIALIZATION CODE SECTION             29-Mar-1982 16:21:03    PA:<

027710  005267  166114          2$:     INC     ML.LUN                          ;                                       4599
027714  026767  166110  152070          CMP     ML.LUN,L$UNIT                   ;                                       4601
027722  002401                          BLT     3$
027724  104444                          TRAP    44
027726  016700  166076          3$:     MOV     ML.LUN,R0                       ;                                       4604
027732  104442                          TRAP    42
027734  010067  164040                  MOV     R0,PTBL.PTR
027740  005767  164034                  TST     PTBL.PTR
027744  001761                          BEQ     2$
027746  017767  164026  166046          MOV     @PTBL.PTR,RH.ADD                ;                                       4606
027754  016701  164020                  MOV     PTBL.PTR,R1                     ;                                       4607
027760  016167  000002  166036          MOV     2(R1),RH.TYP
027766  016701  164006                  MOV     PTBL.PTR,R1                     ;                                       4608
027772  016167  000004  166026          MOV     4(R1),RH.VEC
030000  005002                          CLR     R2                              ; OFFSET                                4609
030002  005001                          CLR     R1                              ; COUNT                                 4611
030004  010100                  4$:     MOV     R1,R0                           ; COUNT,*                               4613
030006  006300                          ASL     R0
030010  006300                          ASL     R0
030012  006300                          ASL     R0
030014  016703  166002                  MOV     RH.ADD,R3
030020  060203                          ADD     R2,R3                           ; OFFSET,*
030022  010360  015404                  MOV     R3,ML.REG(R0)
030026  062702  000002                  ADD     #2,R2                           ; *,OFFSET                              4614
030032  005201                          INC     R1                              ; COUNT                                 4611
030034  020127  000025                  CMP     R1,#25                          ; COUNT,*
030040  003761                          BLE     4$
030042  000454                          BR      10$                             ;                                       4591
030044  012700  000037          5$:     MOV     #37,R0                          ;                                       4621
030050  104447                          TRAP    47
030052  103003                          BHIS    6$
030054  012767  177777  165320          MOV     #-1,DROP.CNT
030062  012700  000035          6$:     MOV     #35,R0                          ;                                       4623
030066  104447                          TRAP    47
030070  103022                          BHIS    8$
030072  005267  165304                  INC     DROP.CNT                        ;                                       4626
030076  032767  000001  152302          BIT     #1,ONEPAS                       ;                                       4628
030104  001411                          BEQ     7$
030106  026727  165270  000001          CMP     DROP.CNT,#1
030114  001005                          BNE     7$
030116  016700  165706                  MOV     ML.LUN,R0                       ;                                       4631
030122  104451                          TRAP    51
030124  104444                          TRAP    44
030126  000403                          BR      8$                              ;                                       4628
030130  012767  177777  165672  7$:     MOV     #-1,ML.LUN                      ;                                       4635
030136  005267  165666          8$:     INC     ML.LUN                          ;                                       4641
030142  026767  165662  151642          CMP     ML.LUN,L$UNIT                   ;                                       4643
030150  002401                          BLT     9$
030152  104444                          TRAP    44
030154  016700  165650          9$:     MOV     ML.LUN,R0                       ;                                       4646
030160  104442                          TRAP    42
030162  010067  163612                  MOV     R0,PTBL.PTR
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               INITIALIZATION CODE SECTION             29-Mar-1982 16:21:03    PA:<

030166  005767  163606                          TST     PTBL.PTR
030172  001761                                  BEQ     8$
030174  016701  163600                  10$:    MOV     PTBL.PTR,R1                     ;                                4650
030200  016167  000014  163602                  MOV     14(R1),PAR.DIS
030206  016701  163566                          MOV     PTBL.PTR,R1                     ;                                4651
030212  016167  000012  165612                  MOV     12(R1),ML.DUT
030220  016701  163554                          MOV     PTBL.PTR,R1                     ;                                4652
030224  016103  000006                          MOV     6(R1),R3
030230  005303                                  DEC     R3
030232  010367  163544                          MOV     R3,OP.NUM.ARR
030236  005067  163544                          CLR     GOOD.BLK                        ;                                4653
030242  005067  163550                          CLR     ARR.16                          ;                                4654
030246  005067  163546                          CLR     LST.ARR                         ;                                4655
030252  005067  163536                          CLR     LST.BLK                         ;                                4656
030256  032767  000001  152116                  BIT     #1,ERRTHR                       ;                                4661
030264  001404                                  BEQ     11$
030266  012767  000012  165104                  MOV     #12,LIMIT
030274  000403                                  BR      12$
030276  012767  077777  165074          11$:    MOV     #77777,LIMIT
030304  016701  163470                  12$:    MOV     PTBL.PTR,R1                     ;                                4668
030310  026127  000010  000001                  CMP     10(R1),#1
030316  001054                                  BNE     13$
030320  012767  000110  165026                  MOV     #110,DRIVE.TYPE                 ;                                4671
030326  012767  140000  165010                  MOV     #-40000,W.C.SIZE                ;                                4672
030334  012767  000200  165004                  MOV     #200,RAS.INC                    ;                                4673
030342  012767  000020  163442                  MOV     #20,CHIP.SIZ                    ;                                4674
030350  012767  001000  163426                  MOV     #1000,ARR.INC                   ;                                4675
030356  052767  017000  163432                  BIS     #17000,ARR.16                   ;                                4676
030364  016703  163412                          MOV     OP.NUM.ARR,R3                   ;                                4677
030370  000303                                  SWAB    R3
030372  006303                                  ASL     R3
030374  042703  160777                          BIC     #160777,R3
030400  042767  017000  163412                  BIC     #17000,LST.ARR
030406  050367  163406                          BIS     R3,LST.ARR
030412  016703  163364                          MOV     OP.NUM.ARR,R3                   ;                                4678
030416  000303                                  SWAB    R3
030420  006303                                  ASL     R3
030422  042703  160777                          BIC     #160777,R3
030426  042767  017000  163360                  BIC     #17000,LST.BLK
030434  050367  163354                          BIS     R3,LST.BLK
030440  052767  000777  163346                  BIS     #777,LST.BLK                    ;                                4679
030446  000456                                  BR      14$                             ;                                4668
030450  012767  000111  164676          13$:    MOV     #111,DRIVE.TYPE                 ;                                4683
030456  005067  164662                          CLR     W.C.SIZE                        ;                                4684
030462  012767  001000  164656                  MOV     #1000,RAS.INC                   ;                                4685
030470  012767  000100  163314                  MOV     #100,CHIP.SIZ                   ;                                4686
030476  012767  004000  163300                  MOV     #4000,ARR.INC                   ;                                4687
030504  052767  074000  163304                  BIS     #74000,ARR.16                   ;                                4691
030512  016703  163264                          MOV     OP.NUM.ARR,R3                   ;                                4692
030516  000303                                  SWAB    R3
030520  006303                                  ASL     R3
030522  006303                                  ASL     R3
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               INITIALIZATION CODE SECTION             29-Mar-1982 16:21:03    PA:<

030524  006303                                  ASL     R3
030526  042703  103777                          BIC     #103777,R3
030532  042767  074000  163260                  BIC     #74000,LST.ARR
030540  050367  163254                          BIS     R3,LST.ARR
030544  016703  163232                          MOV     OP.NUM.ARR,R3                   ;                                4693
030550  000303                                  SWAB    R3
030552  006303                                  ASL     R3
030554  006303                                  ASL     R3
030556  006303                                  ASL     R3
030560  042703  103777                          BIC     #103777,R3
030564  042767  074000  163222                  BIC     #74000,LST.BLK
030572  050367  163216                          BIS     R3,LST.BLK
030576  052767  003777  163210                  BIS     #3777,LST.BLK                   ;                                4694
030604  016701  163170                  14$:    MOV     PTBL.PTR,R1                     ;                                4697
030610  026127  000002  000070                  CMP     2(R1),#70
030616  001004                                  BNE     15$
030620  012767  000025  164530                  MOV     #25,LST.DUT.REG
030626  000403                                  BR      16$
030630  012767  000023  164520          15$:    MOV     #23,LST.DUT.REG
030636  016746  165166                  16$:    MOV     ML.LUN,-(SP)                    ;                                4699
030642  012746  007526                          MOV     #FMT.17,-(SP)
030646  012746  000002                          MOV     #2,-(SP)
030652  010600                                  MOV     SP,R0                           ; SP,*
030654  104414                                  TRAP    14
030656  152777  000040  164560                  BISB    #40,@ML.REG+40
030664  016703  165142                          MOV     ML.DUT,R3
030670  042703  177770                          BIC     #177770,R3
030674  142777  000007  164542                  BICB    #7,@ML.REG+40
030702  150377  164536                          BISB    R3,@ML.REG+40
030706  062706  000006                          ADD     #6,SP                           ;                                4589
030712  000207                                  RTS     PC                              ;                                4567

                                        ; Routine Size:  274 words
                                        ; Maximum stack depth per invocation:  7 words



                                                .SBTTL  L$INIT INITIALIZATION CODE SECTION
030714  004767  176730                  L$INIT::JSR     PC,LINIT                        ;                                4701
030720  104411                                  TRAP    11
030722  000207                                  RTS     PC
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;              INITIALIZATION CODE SECTION      29-Mar-1982 16:21:03    PA:<

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words


;          4704  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (53)

;          4705 %SBTTL 'TEST CODE SECTION'
;          4706
;          4707 !
;          4708 BGNTST;
;          4709
;          4710 !++
;          4711 ! TEST NUMBER:  TST 1
;          4712 !
;          4713 ! TEST NAME:            MASS BUS READY TEST
;          4714 !
;          4715 ! TEST DESCRIPTION:
;          4716 !       TEST THE RH CONTROLLER FOR EXISTANCE
;          4717 !       BY:
;          4718 !
;          4719 !       1.  WRITTING ONES TO THE RH CS2 REGISTER
;          4720 !           RESULTING IN A MASS BUS CLEAR
;          4721 !
;          4722 !       2.  THEN READ THE CS2 REGISTER FOR CLEAR DATA
;          4723 !
;          4724 !--
;          4725
;          4726 local
;          4727     DODU_FLG;                                !DROP UNIT FLAG
;          4728
;          4729 DODU_FLG = ZERO;                             !CLEAR THE DROP UNIT FLAG
;          4730 BGNSUB;
;          4731 CLR_MBUS;
;          4732 MLCS1 = ZEROES;                              !CLEAR OUT CS1
;          4733 MLCS2 = %o'177770';                          !LOAD CS2 WITH ONES  AND FORCE A MBUS CLEAR
;          4734 DELAY (ONE_US);
;          4735
;          4736 if ((.MLCS2) and (%o'177670')) neq ZERO      !SEE IF CS2 GOT CLEARED
;          4737 then
;          4738     begin                                    !REPORT ERROR IF NOT CLEARED
;          4739     ERRDF (119, RH_ERROR, DUMPER);
;          4740     PRINTB (THR_FMT, REG_17, FNC_23, PHR_4);
;          4741     DODU_FLG = ONE;
;          4742     end;
;          4743
;          4744 ENDSUB;
;          4745
;          4746 if .DODU_FLG IS_SET                           !DROP THE UNIT IF DODU_FLG IS SET
;          4747 then
;          4748     begin
;          4749     DODU (.ML_LUN);
;          4750     DOCLN;
;          4751     end;
;          4752
;          4753 ENDTST;
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        .SBTTL  $T1 TEST CODE SECTION
030724  004167  153610        $T1:    JSR     R1,$SAVE2               ;                                               4703
030730  005746                        TST     -(SP)
030732  005002                        CLR     R2                      ; DODU.FLG                                      4729
030734  104402                1$:     TRAP    2
030736  152777  000040  164500        BISB    #40,@ML.REG+40          ;                                               4730
030744  016701  165062                MOV     ML.DUT,R1
030750  042701  177770                BIC     #177770,R1
030754  142777  000007  164462        BICB    #7,@ML.REG+40
030762  150177  164456                BISB    R1,@ML.REG+40
030766  005077  164412                CLR     @ML.REG                 ;                                               4732
030772  012777  177770  164444        MOV     #-10,@ML.REG+40         ;                                               4733
031000  012700  000001                MOV     #1,R0                   ; *,$$TMP2                                      4734
031004  001410                2$:     BEQ     5$
031006  016701  151104                MOV     L$DLY,R1                ; *,$$TMP1
031012  001403                        BEQ     4$
031014  005016                3$:     CLR     (SP)                    ; $$TMP
031016  005301                        DEC     R1                      ; $$TMP1
031020  001375                        BNE     3$
031022  005300                4$:     DEC     R0                      ; $$TMP2
031024  000767                        BR      2$
031026  032777  177670  164410  5$:   BIT     #-110,@ML.REG+40        ;                                               4736
031034  001424                        BEQ     6$
031036  104455                        TRAP    55                      ;                                               4739
031040  000167                        .WORD   167
031042  013302                        .WORD   RH.ERROR
031044  026302                        .WORD   DUMPER
031046  012746  011676                MOV     #PHR.4,-(SP)            ;                                               4740
031052  012746  012464                MOV     #FNC.23,-(SP)
031056  012746  012642                MOV     #REG.17,-(SP)
031062  012746  010256                MOV     #THR.FMT,-(SP)
031066  012746  000004                MOV     #4,-(SP)
031072  010600                        MOV     SP,R0                   ; SP,*
031074  104414                        TRAP    14
031076  012702  000001                MOV     #1,R2                   ; *,DODU.FLG                                    4741
031102  062706  000012                ADD     #12,SP                  ;                                               4738
031106  104467                6$:     TRAP    67                      ;                                               4742
031110  006000                        ROR     R0
031112  103710                        BLO     1$
031114  005302                        DEC     R2                      ; DODU.FLG                                      4746
031116  001004                        BNE     7$
031120  016700  164704                MOV     ML.LUN,R0               ;                                               4749
031124  104451                        TRAP    51
031126  104444                        TRAP    44
031130  005726                7$:     TST     (SP)+                   ;                                               4703
031132  000207                        RTS     PC

                                        ; Routine Size:  68 words
```

```
8231                                    ;ML4AD
8232                                    ;               TEST CODE SECTION
8233
8234                                    ; Maximum stack depth per invocation:  9 words
8239
8240
8244
8245                                            .SBTTL  T1 TEST CODE SECTION
8249 031134                             T1::
8250 031134  004767  177564             1$:     JSR     PC,$T1                  ;                       4751
8251 031140  104466                             TRAP    66
8252 031142  006000                             ROR     R0
8253 031144  103773                             BLO     1$
8254 031146  000207                             RTS     PC
8255
8256                                    ; Routine Size:  6 words
8257                                    ; Maximum stack depth per invocation:  0 words
8262
8263
8264 ;          4754  !<BLF/PAGE>
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (54)
8266 ;ML4AD
8267 ;                  TEST CODE SECTION
8268 ;
8269 ;          4755  !
8270 ;          4756  BGNTST;
8271 ;          4757
8272 ;          4758  !++
8273 ;          4759  ! TEST NUMBER:  TST 2
8274 ;          4760  !
8275 ;          4761  ! TEST NAME:    MASS BUS HANDSHAKE TEST
8276 ;          4762  !
8277 ;          4763  ! TEST DESCRIPTION:
8278 ;          4764  !       TEST MASS BUS TO UNIBUS COMMUMICATIONS
8279 ;          4765  !       VIA THE CONTROL BUS BY:
8280 ;          4766  !
8281 ;          4767  !       1.  READING RH AND DRIVE REGISTERS AND
8282 ;          4768  !           TEST THE NON EXISTANT DRIVE 'NED'
8283 ;          4769  !           BIT
8284 ;          4770  !
8285 ;          4771  !--
8286 ;          4772
8287 ;          4773  local
8288 ;          4774      SAVE,                                     !TEMPORARY SAVE LOCATION
8289 ;          4775      DODU_FLG;                                 !DROP UNIT FLAG
8290 ;          4776
8291 ;          4777  CLR_THRESHOLD;                                !CLEAR ERROR PRINT THRESHOLD
8292 ;          4778  DODU_FLG = ZERO;
8293 ;          4779
8294 ;          4780  incr REG_SEL from 0 to .LST_DUT_REG do        !TEST ALL PRESENT RH REGISTERS
8295 ;          4781      begin
8296 ;          4782      BGNSUB;                                   !START OF SCOPE LOOP
8297 ;          4783      CLR_MBUS;
8298 ;          4784      SAVE = ..ML_REG [.REG_SEL, REGISTER_ADD];  !READ THE REGISTER
8299 ;          4785      DELAY (ONE_US);                           !DELAY ONE MICRO SECOND
8300 ;          4786
8301 ;          4787      if .NED IS_SET                            !DID READ CAUSE THE NED BIT TO SET
8302 ;          4788      then
8303 ;          4789          begin                                 !REPORT AN ERROR IF SET
8304 ;          4790          CMP_THRESHOLD;                        !COMPARE ERROR PRINT THRESHOLD
8305 ;          4791          ERRDF (120, RH_ERROR, DUMPER);
8306 ;          4792          PRINTB (FIV_FMT, WRD_62, PHR_5, WRD_12, WRD_52, FNC_6);
8307 ;          4793          PRINTB (FMT_11, .ML_REG [.REG_SEL, REGISTER_ADD]);
8308 ;          4794          DODU_FLG = ONE;
8309 ;          4795          end;
8310 ;          4796
8311 ;          4797      ENDSUB;                                   !END OF SCOPE LOOP
8312 ;          4798      end;
8313 ;          4799
8314 ;          4800  if .DODU_FLG IS_SET
8315 ;          4801  then
8316 ;          4802      begin
8317 ;          4803      DODU (.ML_LUN);
8318 ;          4804      DOCLN;
8319 ;          4805      end;
8320 ;          4806
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (54)

;          4807  ENDTST;

                                        .SBTTL  $T2 TEST CODE SECTION
031150  004167  153436          $T2:    JSR     R1,$SAVE5                       ;                                   4753
031154  024646                          CMP     -(SP),-(SP)
031156  005067  164214                  CLR     P.CNT                           ;                                   4775
031162  005001                          CLR     R1                              ; DODU.FLG                          4778
031164  016746  164166                  MOV     LST.DUT.REG,-(SP)               ;                                   4780
031170  005002                          CLR     R2                              ; REG.SEL
031172  000517                          BR      9$
031174  010200                  1$:     MOV     R2,R0                           ; REG.SEL,*                         4784
031176  006300                          ASL     R0
031200  006300                          ASL     R0
031202  006300                          ASL     R0
031204  010003                          MOV     R0,R3
031206  104402                  2$:     TRAP    2                               ;                                   4781
031210  152777  000040  164226          BISB    #40,@ML.REG+40                  ;                                   4782
031216  016705  164610                  MOV     ML.DUT,R5
031222  042705  177770                  BIC     #177770,R5
031226  142777  000007  164210          BICB    #7,@ML.REG+40
031234  150577  164204                  BISB    R5,@ML.REG+40
031240  017366  015404  000002          MOV     @ML.REG(R3),2(SP)               ; *,SAVE                            4784
031246  012704  000001                  MOV     #1,R4                           ; *,$$TMP2                          4785
031252  001411                  3$:     BEQ     6$
031254  016705  150636                  MOV     L$DLY,R5                        ; *,$$TMP1
031260  001404                          BEQ     5$
031262  005066  000004          4$:     CLR     4(SP)                           ; $$TMP
031266  005305                          DEC     R5                              ; $$TMP1
031270  001374                          BNE     4$
031272  005304                  5$:     DEC     R4                              ; $$TMP2
031274  000766                          BR      3$
031276  032777  010000  164140  6$:     BIT     #10000,@ML.REG+40               ;                                   4787
031304  001446                          BEQ     7$
031306  005267  164064                  INC     P.CNT                           ;                                   4789
031312  026767  164060  164060          CMP     P.CNT,LIMIT
031320  003043                          BGT     8$
031322  104455                          TRAP    55                              ;                                   4791
031324  000170                          .WORD   170
031326  013302                          .WORD   RH.ERROR
031330  026302                          .WORD   DUMPER
031332  012746  012226                  MOV     #FNC.6,-(SP)                    ;                                   4792
031336  012746  011310                  MOV     #WRD.52,-(SP)
031342  012746  010650                  MOV     #WRD.12,-(SP)
031346  012746  011714                  MOV     #PHR.5,-(SP)
031352  012746  011432                  MOV     #WRD.62,-(SP)
031356  012746  010304                  MOV     #FIV.FMT,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

031362  012746  000006                          MOV     #6,-(SP)
031366  010600                                  MOV     SP,R0                           ; SP,*
031370  104414                                  TRAP    14
031372  016316  015404                          MOV     ML.REG(R3),(SP)                 ;                                4793
031376  012746  007170                          MOV     #FMT.11,-(SP)
031402  012746  000002                          MOV     #2,-(SP)
031406  010600                                  MOV     SP,R0                           ; SP,*
031410  104414                                  TRAP    14
031412  012701  000001                          MOV     #1,R1                           ; *,DODU.FLG                     4794
031416  062706  000022                          ADD     #22,SP                          ;                                4789
031422  104467                          7$:     TRAP    67                              ;                                4795
031424  006000                                  ROR     R0
031426  103667                                  BLO     2$
031430  005202                          8$:     INC     R2                              ; REG.SEL                        4780
031432  020216                          9$:     CMP     R2,(SP)                         ; REG.SEL,*
031434  003657                                  BLE     1$
031436  005301                                  DEC     R1                              ; DODU.FLG                       4800
031440  001004                                  BNE     10$
031442  016700  164362                          MOV     ML.LUN,R0                       ;                                4803
031446  104451                                  TRAP    51
031450  104444                                  TRAP    44
031452  062706  000006                  10$:    ADD     #6,SP                           ;                                4753
031456  000207                                  RTS     PC

                                        ; Routine Size:  100 words
                                        ; Maximum stack depth per invocation:  18 words



                                                .SBTTL  T2 TEST CODE SECTION
031460                                  T2::
031460  004767  177464                  1$:     JSR     PC,$T2                          ;                                4805
031464  104466                                  TRAP    66
031466  006000                                  ROR     R0
031470  103773                                  BLO     1$
031472  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
8438
8439
8440 ;          4808  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (55)

;                                                               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 3
;               !
;               ! TEST NAME:    DRIVE PRESENT TEST
;               !
;               ! TEST DESCRIPTION:
;               !       THIS TEST READS THE DESIRED SECTOR
;               !       ADDRESS REGISTER OF THE DRIVE UNDER
;               !       TEST, DELAYS 100 US, THEN
;               !       READS THE  NED BIT OF MLCS2
;               !
;               !       IF SET, AN ERROR MESSAGE IS
;               !       PRINTED AND THE UNIT IS DROPPED
;               !
;               !--
;
;               local
;                   DODU_FLG,                                   !DROP UNIT FLAG
;                   SAVE;                                       !TEMP STORAGE LOCATION
;
;               DODU_FLG = ZERO;
;               BGNSUB;
;               CLR_MBUS;
;               SAVE = .MLDA;                                   !READ A DRIVE REGISTER
;               DELAY (ONE_US);                                 !DELAY 1 US
;
;               if .NED IS_SET                                  !TEST THE NED BIT
;               then
;                   begin
;                   ERRDF (1, ASYNC, DUMPER);                   !IF SET THEN REPORT ERROR AND SET DODU_FLG
;                   PRINTB (ONE_FMT, PHR_3);
;                   DODU_FLG = ONE;
;                   end;
;
;               ENDSUB;
;
;               if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU IS_SET
;               then
;                   begin
;                   DODU (.ML_LUN);
;                   DOCLN;
;                   end;
;
;               ENDTST;

                                        .SBTTL  $T3 TEST CODE SECTION
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

031474  004167  153072                  $T3:    JSR     R1,$SAVE4                       ;                                       4807
031500  005746                                  TST     -(SP)
031502  005003                                  CLR     R3                              ; DODU.FLG                              4832
031504  104402                          1$:     TRAP    2
031506  152777  000040  163730                  BISB    #40,@ML.REG+40                  ;                                       4833
031514  016702  164312                          MOV     ML.DUT,R2
031520  042702  177770                          BIC     #177770,R2
031524  142777  000007  163712                  BICB    #7,@ML.REG+40
031532  150277  163706                          BISB    R2,@ML.REG+40
031536  017704  163672                          MOV     @ML.REG+30,R4                   ; *,SAVE                                4835
031542  012701  000001                          MOV     #1,R1                           ; *,$$TMP2                              4836
031546  001410                          2$:     BEQ     5$
031550  016702  150342                          MOV     L$DLY,R2                        ; *,$$TMP1
031554  001403                                  BEQ     4$
031556  005016                          3$:     CLR     (SP)                            ; $$TMP
031560  005302                                  DEC     R2                              ; $$TMP1
031562  001375                                  BNE     3$
031564  005301                          4$:     DEC     R1                              ; $$TMP2
031566  000767                                  BR      2$
031570  032777  010000  163646          5$:     BIT     #10000,@ML.REG+40               ;                                       4838
031576  001420                                  BEQ     6$
031600  104455                                  TRAP    55                              ;                                       4841
031602  000001                                  .WORD   1
031604  012706                                  .WORD   ASYNC
031606  026302                                  .WORD   DUMPER
031610  012746  011644                          MOV     #PHR.3,-(SP)                    ;                                       4842
031614  012746  010240                          MOV     #ONE.FMT,-(SP)
031620  012746  000002                          MOV     #2,-(SP)
031624  010600                                  MOV     SP,R0                           ; SP,*
031626  104414                                  TRAP    14
031630  012703  000001                          MOV     #1,R3                           ; *,DODU.FLG                            4843
031634  062706  000006                          ADD     #6,SP                           ;                                       4840
031640  104467                          6$:     TRAP    67                              ;                                       4844
031642  006000                                  ROR     R0
031644  103717                                  BLO     1$
031646  005303                                  DEC     R3                              ; DODU.FLG                              4848
031650  001004                                  BNE     7$
031652  016700  164152                          MOV     ML.LUN,R0                       ;                                       4851
031656  104451                                  TRAP    51
031660  104444                                  TRAP    44
031662  005726                          7$:     TST     (SP)+                           ;                                       4807
031664  000207                                  RTS     PC

                                        ; Routine Size:  61 words
                                        ; Maximum stack depth per invocation:  9 words
```

```
 8554 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bl..s-16 V2(212)
 8555 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (55)
 8556
 8560
 8561                                        .SBTTL  T3 TEST CODE SECTION
 8565 031666                           T3::
 8566 031666  004767  177602          1$:    JSR     PC,$T3                  ;                        4853
 8567 031672  104466                         TRAP    66
 8568 031674  006000                         ROR     R0
 8569 031676  103773                         BLO     1$
 8570 031700  000207                         RTS     PC
 8571
 8572                                  ; Routine Size:  6 words
 8573                                  ; Maximum stack depth per invocation:  0 words
 8578
 8579
 8580 ;          4856  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (56)
;
;          4857  !
;          4858  BGNTST;
;          4859
;          4860  !++
;          4861  ! TEST NUMBER:  TST 4
;          4862  !
;          4863  ! TEST NAME:    DRIVE SELECTION TEST
;          4864  !
;          4865  ! TEST DESCRIPTION:
;          4866  !       THIS TEST TESTS FOR UNIQUE DRIVE SELECTION BY WRITING THE DRIVE
;          4867  !       UNDER TEST (DUT) DRIVE NUMBER INTO ITS DSA REG.  THEN WRITING THE DRIVE
;          4868  !       NUMBERS OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REGISTERS
;          4869  !       AND READING THE DUT DSA FOR ITS DRIVE NUMBER.
;          4870  !
;          4871  ! IMPLICIT INPUTS:
;          4872  !       ML_DUT
;          4873  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE DRIVE
;          4874  !       NUMBER OF THE DRIVE PRESENTLY BEING TESTED.
;          4875  !--
;          4876
;          4877  local
;          4878      SAVE;                                 !TEMPORARY SAVE LOCATION
;          4879
;          4880  BGNSUB;
;          4881  CLR_MBUS;
;          4882  MLDA = .ML_DUT;                           !LOAD THIS DRIVES DRIVE NO. INTO ITS DSA REG
;          4883  SAVE = .MLDA;                             !READ THE REGISTER BACK
;          4884
;          4885  if .SAVE neq .ML_DUT                      !SEE IF DSA HAS DRIVE NUMBER
;          4886  then
;          4887      begin
;          4888      ERRDF (2, INTER, DUMPER);             !ERROR AND EXIT TEST IF DSA NEQ DRIVE NUM
;          4889      PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_3, WRD_37, WRD_13, REG_6);
;          4890      PRINTB (FMT_2, .ML_DUT, .SAVE, (.ML_DUT xor .SAVE));
;          4891      EXIT_TST;
;          4892      end;
;          4893
;          4894  incr DRV_SEL from 0 to 7 do               !WRITE DRV NO OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REG.
;          4895
;          4896      if .DRV_SEL neq .ML_DUT               !SKIP IF .DRV_SEL EQL TO THE DRIVE UNDER TEST (DUT)
;          4897      then
;          4898          begin
;          4899          DRV_NUM = .DRV_SEL;               !SELECT DRIVE TO BE WRITTEN TO
;          4900          MLDA = .DRV_SEL;                  !WRITE DRIVE SEL NO. INTO ITS DSA REG
;          4901          DELAY (ONE_US);                   !DELAY 1 US
;          4902          end;
;          4903
;          4904  DRV_NUM = .ML_DUT;                       !SELECT THE DUT
;          4905  SAVE = .MLDA;                             !READ ITS DSA REG
;          4906
;          4907  if .SAVE neq .ML_DUT                      !SEE IF WRITTING TO OTHER DRIVES CHANGE ITS VALUE
;          4908  then
```

```
8638 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
8639 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (56)
8640
8641 ;          4909      begin
8642 ;          4910      ERRDF (3, ASYNC, DUMPER);                    !ERROR AND SET DODU_FLG IF CHANGED
8643 ;          4911      PRINTB (THR_FMT, FNC_3, WRD_37, WRD_14);
8644 ;          4912      PRINTB (FMT_1, .ML_DUT, .SAVE);
8645 ;          4913      end;
8646 ;          4914
8647 ;          4915  ENDSUB;
8648 ;          4916  ENDTST;
8652
8653                                          .SBTTL  $T4 TEST CODE SECTION
8657 031702  004167  152646          $T4:    JSR     R1,$SAVE3                ;                          4855
8658 031706  005746                          TST     -(SP)
8659 031710  104402                  1$:     TRAP    2                        ;                          4878
8660 031712  152777  000040  163524          BISB    #40,@ML.REG+40           ;                          4880
8661 031720  016702  164106                  MOV     ML.DUT,R2
8662 031724  042702  177770                  BIC     #177770,R2
8663 031730  142777  000007  163506          BICB    #7,@ML.REG+40
8664 031736  150277  163502                  BISB    R2,@ML.REG+40
8665 031742  016777  164064  163464          MOV     ML.DUT,@ML.REG+30        ;                          4882
8666 031750  017703  163460                  MOV     @ML.REG+30,R3            ; *,SAVE                   4883
8667 031754  020367  164052                  CMP     R3,ML.DUT                ; SAVE,*                   4885
8668 031760  001451                          BEQ     2$
8669 031762  104455                          TRAP    55                       ;                          4888
8670 031764  000002                          .WORD   2
8671 031766  013114                          .WORD   INTER
8672 031770  026302                          .WORD   DUMPER
8673 031772  012746  012540                  MOV     #REG.6,-(SP)             ;                          4889
8674 031776  012746  010660                  MOV     #WRD.13,-(SP)
8675 032002  012746  011122                  MOV     #WRD.37,-(SP)
8676 032006  012746  012172                  MOV     #FNC.3,-(SP)
8677 032012  012746  010650                  MOV     #WRD.12,-(SP)
8678 032016  012746  011676                  MOV     #PHR.4,-(SP)
8679 032022  012746  010322                  MOV     #SIX.FMT,-(SP)
8680 032026  012746  000007                  MOV     #7,-(SP)
8681 032032  010600                          MOV     SP,R0                    ; SP,*
8682 032034  104414                          TRAP    14
8683 032036  016716  163770                  MOV     ML.DUT,(SP)              ;                          4890
8684 032042  010302                          MOV     R3,R2                    ; SAVE,*
8685 032044  041602                          BIC     (SP),R2
8686 032046  040316                          BIC     R3,(SP)                  ; SAVE,*
8687 032050  050216                          BIS     R2,(SP)
8688 032052  010346                          MOV     R3,-(SP)                 ; SAVE,*
8689 032054  016746  163752                  MOV     ML.DUT,-(SP)
8690 032060  012746  006506                  MOV     #FMT.2,-(SP)
8691 032064  012746  000004                  MOV     #4,-(SP)
8692 032070  010600                          MOV     SP,R0                    ; SP,*
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

032072  104414                                  TRAP    14
032074  104463                                  TRAP    63
032076  062706  000030                          ADD     #30,SP                  ;                                       4885
032102  000513                                  BR      9$                      ;                                       4887
032104  005002                          2$:     CLR     R2                      ; DRV.SEL                               4894
032106  020267  163720                  3$:     CMP     R2,ML.DUT               ; DRV.SEL,*                             4896
032112  001425                                  BEQ     7$
032114  010201                                  MOV     R2,R1                   ; DRV.SEL,*                             4899
032116  042701  177770                          BIC     #177770,R1
032122  142777  000007  163314                  BICB    #7,@ML.REG+40
032130  150177  163310                          BISB    R1,@ML.REG+40
032134  010277  163274                          MOV     R2,@ML.REG+30           ; DRV.SEL,*                             4900
032140  012700  000001                          MOV     #1,R0                   ; *,$$TMP2                              4901
032144  001410                          4$:     BEQ     7$
032146  016701  147744                          MOV     L$DLY,R1                ; *,$$TMP1
032152  001403                                  BEQ     6$
032154  005016                          5$:     CLR     (SP)                    ; $$TMP
032156  005301                                  DEC     R1                      ; $$TMP1
032160  001375                                  BNE     5$
032162  005300                          6$:     DEC     R0                      ; $$TMP2
032164  000767                                  BR      4$
032166  005202                          7$:     INC     R2                      ; DRV.SEL                               4894
032170  020227  000007                          CMP     R2,#7                   ; DRV.SEL,*
032174  003744                                  BLE     3$
032176  016702  163630                          MOV     ML.DUT,R2               ;                                       4904
032202  042702  177770                          BIC     #177770,R2
032206  142777  000007  163230                  BICB    #7,@ML.REG+40
032214  150277  163224                          BISB    R2,@ML.REG+40
032220  017703  163210                          MOV     @ML.REG+30,R3           ; *,SAVE                                4905
032224  020367  163602                          CMP     R3,ML.DUT               ; SAVE,*                                4907
032230  001433                                  BEQ     8$
032232  104455                                  TRAP    55                      ;                                       4910
032234  000003                                  .WORD   3
032236  012706                                  .WORD   ASYNC
032240  026302                                  .WORD   DUMPER
032242  012746  010664                          MOV     #WRD.14,-(SP)           ;                                       4911
032246  012746  011122                          MOV     #WRD.37,-(SP)
032252  012746  012172                          MOV     #FNC.3,-(SP)
032256  012746  010256                          MOV     #THR.FMT,-(SP)
032262  012746  000004                          MOV     #4,-(SP)
032266  010600                                  MOV     SP,R0                   ; SP,*
032270  104414                                  TRAP    14
032272  010316                                  MOV     R3,(SP)                 ; SAVE,*                                4912
032274  016746  163532                          MOV     ML.DUT,-(SP)
032300  012746  006442                          MOV     #FMT.1,-(SP)
032304  012746  000003                          MOV     #3,-(SP)
032310  010600                                  MOV     SP,R0                   ; SP,*
032312  104414                                  TRAP    14
032314  062706  000020                          ADD     #20,SP                  ;                                       4909
032320  104467                          8$:     TRAP    67                      ;                                       4913
032322  006000                                  ROR     R0
032324  103002                                  BHIS    9$
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<

032326  000167  177356                JMP     1$
032332  005726          9$:   TST     (SP)+                   ;                                       4855
032334  000207                RTS     PC

                                ; Routine Size:  142 words
                                ; Maximum stack depth per invocation:  17 words


                                        .SBTTL  T4 TEST CODE SECTION
032336                          T4::
032336  004767  177340          1$:   JSR     PC,$T4                  ;                                       4915
032342  104466                TRAP    66
032344  006000                ROR     R0
032346  103773                BLO     1$
032350  000207                RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;         4917  !<BLF/PAGE>
```

```
8790 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
8791 ;                TEST CODE SECTION                        29-Mar-1982 16.21:03    PA:<NEALE>ML4AD.BLI.4 (57)
8792 ;
8793 ;          4918  !
8794 ;          4919  BGNTST;
8795 ;          4920
8796 ;          4921  !++
8797 ;          4922  ! TEST NUMBER:  TST 5
8798 ;          4923  !
8799 ;          4924  ! TEST NAME:    READ WRITE REG ONES/ZEROES TEST
8800 ;          4925  !
8801 ;          4926  ! TEST DESCRIPTION:
8802 ;          4927  !       THIS TEST WRITES AND READS A DATA PATTERN OF ALL ONES AND ZEROES TO ALL
8803 ;          4928  !       OF THE ML11'S READ / WRITE REGISTERS.
8804 ;          4929  !
8805 ;          4930  !       ROUTINES WRT_REG AND RD_REG ACCEPT ARGUMENTS TO FURTHER SELECT ROUTINES
8806 ;          4931  !       WHICH ACTUALLY PERFORMS THE READING AND WRITING OF THE REGISTERS.
8807 ;          4932  !
8808 ;          4933  !       THE UNIT IS DROPPED ON DETECTED ERRORS.
8809 ;          4934  !
8810 ;          4935  ! IMPLICIT INPUTS:
8811 ;          4936  !       WT_DATA
8812 ;          4937  !       LOADED BY READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN WRITTEN
8813 ;          4938  !       TO THE REGISTERS (REPRESENTS GOOD DATA).
8814 ;          4939  !
8815 ;          4940  !       RD_DATA
8816 ;          4941  !       LOADED BY THE READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN
8817 ;          4942  !       READ FROM THE REGISTER (REPRESENTS BAD DATA).
8818 ;          4943  !--
8819 ;          4944
8820 ;          4945  local
8821 ;          4946      ERR_FLG,                              !ERROR FLAG PASSED TO ROUTINES
8822 ;          4947      TST_PAT,                              !TEST PATTERN
8823 ;          4948      index,                                !POINTS TO REGISTER PRESENTLY BEING TESTED
8824 ;          4949      DODU_FLG;                             !DROP UNIT FLAG
8825 ;          4950
8826 ;          4951  CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
8827 ;          4952  DODU_FLG = ZERO;
8828 ;          4953  TST_PAT = ONES;                           !LOAD TEST PAT WITH ONES
8829 ;          4954
8830 ;          4955  incr TWICE from 0 to 1 do                !REPEAT LOOP TWICE
8831 ;          4956      begin
8832 ;          4957
8833 ;          4958      incr REG_SEL from 0 to 7 do           !TEST ELEVEN WRITE/READ REGISTERS
8834 ;          4959          begin
8835 ;          4960          BGNSUB;
8836 ;          4961          CLR_MBUS;
8837 ;          4962          WRT_REG (.TST_PAT, .REG_SEL, index);  !WRITE TO THE REGISTER
8838 ;          4963          RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);  !READ THE REGISTER
8839 ;          4964
8840 ;          4965          if .ERR_FLG IS_SET                !SEE IF READ FOUND AN ERROR
8841 ;          4966          then
8842 ;          4967              begin                         !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
8843 ;          4968              CMP_THRESHOLD;                !COMPARE ERROR PRINT THRESHOLD
8844 ;          4969
```

```
                                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (57)
 8846 ;ML4AD
 8847 ;                  TEST CODE SECTION
 8848 ;
 8849 ;          4970            selectone .REG_SEL of               !SELECT WHICH MODULE FAILED
 8850 ;          4971            set
 8851 ;          4972
 8852 ;          4973            [0 to 3] :
 8853 ;          4974                ERRDF (4, ASYNC, DUMPER);       !ASYNC MODULE FAILURE
 8854 ;          4975
 8855 ;          4976            [4 to 5] :
 8856 ;          4977                ERRDF (4, SYNC, DUMPER);        !SYNC MODULE FAILURE
 8857 ;          4978
 8858 ;          4979            [6 to 7] :
 8859 ;          4980                ERRDF (4, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
 8860 ;          4981            tes;
 8861 ;          4982
 8862 ;          4983            PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
 8863 ;          4984            PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
 8864 ;          4985            DODU_FLG = ONE;
 8865 ;          4986            end;
 8866 ;          4987
 8867 ;          4988        ENDSUB;
 8868 ;          4989        end;
 8869 ;          4990
 8870 ;          4991    TST_PAT = not .TST_PAT;                     !REPEAT AGAIN WITH COMPLIMENT DATA
 8871 ;          4992    end;
 8872 ;          4993
 8873 ;          4994    if .DODU_FLG IS_SET                         !DROP THIS UNIT IF THE DODU_FLG IS_SET
 8874 ;          4995    then
 8875 ;          4996        begin
 8876 ;          4997        DODU (.ML_LUN);
 8877 ;          4998        DOCLN;
 8878 ;          4999        end;
 8879 ;          5000
 8880 ;          5001    ENDTST;
 8884
                                        .SBTTL  $T5 TEST CODE SECTION
 8889 032352  004167  152214            $T5:    JSR     R1,$SAVE4                   ;                       4916
 8890 032356  024646                            CMP     -(SP),-(SP)
 8891 032360  005067  163012                    CLR     P.CNT                       ;                       4949
 8892 032364  005004                            CLR     R4                          ; DODU.FLG              4952
 8893 032366  012702  177777                    MOV     #-1,R2                      ; *,TST.PAT             4953
 8894 032372  005001                            CLR     R1                          ; TWICE                 4955
 8895 032374  005003                    1$:     CLR     R3                          ; REG.SEL               4958
 8896 032376  104402                    2$:     TRAP    2                           ;                       4959
 8897 032400  152777  000040  163036            BISB    #40,@ML.REG+40              ;                       4960
 8898 032406  016700  163420                    MOV     ML.DUT,R0
 8899 032412  042700  177770                    BIC     #177770,R0
 8900 032416  142777  000007  163020            BICB    #7,@ML.REG+40
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

032424  150077  163014                          BISB    R0,@ML.REG+40
032430  010246                                  MOV     R2,-(SP)                        ; TST.PAT,*                     4962
032432  010346                                  MOV     R3,-(SP)                        ; REG.SEL,*
032434  012746  000010                          MOV     #10,-(SP)
032440  060616                                  ADD     SP,(SP)                         ; INDEX,*
032442  004767  172656                          JSR     PC,WRT.REG
032446  010216                                  MOV     R2,(SP)                         ; TST.PAT,*                     4963
032450  010346                                  MOV     R3,-(SP)                        ; REG.SEL,*
032452  012746  000012                          MOV     #12,-(SP)
032456  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
032460  004767  173226                          JSR     PC,RD.REG
032464  026627  000012  000001                  CMP     12(SP),#1                       ; ERR.FLG,*                     4965
032472  001117                                  BNE     7$
032474  005267  162676                          INC     P.CNT                           ;                               4967
032500  026767  162672  162672                  CMP     P.CNT,LIMIT
032506  003403                                  BLE     3$
032510  062706  000012                          ADD     #12,SP
032514  000513                                  BR      8$
032516  005703                          3$:     TST     R3                              ; REG.SEL                       4970
032520  002410                                  BLT     4$
032522  020327  000003                          CMP     R3,#3                           ; REG.SEL,*
032526  003005                                  BGT     4$
032530  104455                                  TRAP    55                              ;                               4974
032532  000004                                  .WORD   4
032534  012706                                  .WORD   ASYNC
032536  026302                                  .WORD   DUMPER
032540  000425                                  BR      6$                              ;                               4970
032542  020327  000004                  4$:     CMP     R3,#4                           ; REG.SEL,*
032546  002410                                  BLT     5$
032550  020327  000005                          CMP     R3,#5                           ; REG.SEL,*
032554  003005                                  BGT     5$
032556  104455                                  TRAP    55                              ;                               4977
032560  000004                                  .WORD   4
032562  012750                                  .WORD   SYNC
032564  026302                                  .WORD   DUMPER
032566  000412                                  BR      6$                              ;                               4970
032570  020327  000006                  5$:     CMP     R3,#6                           ; REG.SEL,*
032574  002407                                  BLT     6$
032576  020327  000007                          CMP     R3,#7                           ; REG.SEL,*
032602  003004                                  BGT     6$
032604  104455                                  TRAP    55                              ;                               4980
032606  000004                                  .WORD   4
032610  013012                                  .WORD   ARR.DAT
032612  026302                                  .WORD   DUMPER
032614  012746  011344                  6$:     MOV     #WRD.56,-(SP)                   ;                               4983
032620  012746  011310                          MOV     #WRD.52,-(SP)
032624  012746  012226                          MOV     #FNC.6,-(SP)
032630  012746  012216                          MOV     #FNC.5,-(SP)
032634  012746  010650                          MOV     #WRD.12,-(SP)
032640  012746  011676                          MOV     #PHR.4,-(SP)
032644  012746  010322                          MOV     #SIX.FMT,-(SP)
032650  012746  000007                          MOV     #7,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 15:21:03    PA:<

032654  010600                                  MOV     SP,R0                           ; SP,*
032656  104414                                  TRAP    14
032660  016716  162466                          MOV     RD.DATA,(SP)                    ;                                       4984
032664  016746  162460                          MOV     WT.DATA,-(SP)
032670  016600  000036                          MOV     36(SP),R0                       ; INDEX,*
032674  006300                                  ASL     R0
032676  006300                                  ASL     R0
032700  006300                                  ASL     R0
032702  016046  015404                          MOV     ML.REG(R0),-(SP)
032706  012746  007436                          MOV     #FMT.16,-(SP)
032712  012746  000004                          MOV     #4,-(SP)
032716  010600                                  MOV     SP,R0                           ; SP,*
032720  104414                                  TRAP    14
032722  012704  000001                          MOV     #1,R4                           ; *,DODU.FLG                            4985
032726  062706  000030                          ADD     #30,SP                          ;                                       4967
032732  062706  000012                  7$:     ADD     #12,SP                          ;                                       4959
032736  104467                                  TRAP    67                              ;                                       4986
032740  006000                                  ROR     R0
032742  103615                                  BLO     2$
032744  005203                          8$:     INC     R3                              ; REG.SEL                               4958
032746  020327  000007                          CMP     R3,#7                           ; REG.SEL,*
032752  003611                                  BLE     2$
032754  005102                                  COM     R2                              ; TST.PAT                               4991
032756  005201                                  INC     R1                              ; TWICE                                 4955
032760  020127  000001                          CMP     R1,#1                           ; TWICE,*
032764  003603                                  BLE     1$
032766  005304                                  DEC     R4                              ; DODU.FLG                              4994
032770  001004                                  BNE     9$
032772  016700  163032                          MOV     ML.LUN,R0                       ;                                       4997
032776  104451                                  TRAP    51
033000  104444                                  TRAP    44
033002  022626                          9$:     CMP     (SP)+,(SP)+                     ;                                       4916
033004  000207                                  RTS     PC

                                        ; Routine Size:  142 words
                                        ; Maximum stack depth per invocation:  24 words



                                                .SBTTL  T5 TEST CODE SECTION
033006                                  T5::
033006  004767  177340                  1$:     JSR     PC,$T5                          ;                                       4999
```

```
                                ;ML4AD
                                ;               TEST CODE SECTION

033012  104466                          TRAP    66
033014  006000                          ROR     R0
033016  103773                          BLO     1$
033020  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;          5002  !<BLF/PAGE>
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```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (58)

;          5003  !
;          5004  BGNTST;
;          5005
;          5006  !++
;          5007  ! TEST NUMBER:  TST 6
;          5008  !
;          5009  ! TEST NAME:    READ WRITE REG SHIFTING ONES/ZEROES TEST
;          5010  !
;          5011  ! TEST DESCRIPTION:
;          5012  !       THIS TEST WRITES AND READS A
;          5013  !       SHIFTING ONE'S AND SHIFTING ZEROE'S
;          5014  !       PATTERN TO ALL THE ML11'S
;          5015  !       READ/WRITE REGISTERS
;          5016  !
;          5017  !       ROUTINES WRT_REG AND RD_REG
;          5018  !       ACCEPT ARGUMENTS TO FURTHER
;          5019  !       SELECT ROUTINES WHICH ACTUALLY
;          5020  !       PERFORMS THE READING AND
;          5021  !       WRITING OF THE REGISTERS.
;          5022  !
;          5023  !       THE DRIVE IS DROPPED ON DETECTED
;          5024  !       ERRORS.
;          5025  !
;          5026  ! IMPLICIT INPUTS:
;          5027  !       WT_DATA
;          5028  !         LOADED BY READ REGISTER ROUTINES AND
;          5029  !         CONTAINS THE DATA PATTERN WRITTEN TO THE
;          5030  !         REGISTERS (REPRESENTS GOOD DATA).
;          5031  !
;          5032  !       RD_DATA
;          5033  !         LOADED BY THE READ REGISTER ROUTINES AND
;          5034  !         CONTAINS THE DATA PATTERN READ FROM THE
;          5035  !         REGISTER (REPRESENTS BAD DATA).
;          5036  !
;          5037  !
;          5038  !--
;          5039
;          5040  local
;          5041      ERR_FLG,                          !ERROR FLAG PASSED TO ROUTINE
;          5042      TST_PAT,                          !TEST PATTERN
;          5043      index,                            !POINTS TO REG PRESENTLY BEING TESTED
;          5044      DODU_FLG;                         !DROP UNIT FLAG
;          5045
;          5046  CLR_THRESHOLD;                       !CLEAR ERROR PRINT THRESHOLD
;          5047  DODU_FLG = ZERO;
;          5048  TST_PAT = ONE;                        !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
;          5049
;          5050  incr SHIFT from 0 to 15 do           !DO SHIFT 16 TIMES
;          5051      begin
;          5052
;          5053      incr TWICE from 0 to 1 do         !REPEAT LOOP TWICE
;          5054          begin
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (58)
;
;          5055
;          5056          incr REG_SEL from 0 to 7 do             !TEST ELEVEN READ/WRITE REGISTERS
;          5057              begin
;          5058              BGNSUB;
;          5059              CLR_MBUS;
;          5060              WRT_REG (.TST_PAT, .REG_SEL, index);        !WRITE TO THE REGISTER
;          5061              RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);       !READ THE REGISTER
;          5062
;          5063              if .ERR_FLG IS_SET                      !SEE IF THE READ FOUND AN ERROR
;          5064              then
;          5065                  begin                               !IF THE ERROR FLAG IS SET THEN ERROR
;          5066                  CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;          5067
;          5068                  selectone .REG_SEL of               !FIND WHICH MODULE FAILED
;          5069                      set
;          5070
;          5071                      [0 to 3] :
;          5072                          ERRDF (5, ASYNC, DUMPER);       !ASYNC MODULE FAILURE
;          5073
;          5074                      [4 to 5] :
;          5075                          ERRDF (5, SYNC, DUMPER);        !SYNC MODULE FAILURE
;          5076
;          5077                      [6 to 7] :
;          5078                          ERRDF (5, ARR_DAT, DUMPER);     !ARRAY DATA MODULE FAILURE
;          5079                      tes;
;          5080
;          5081                  PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;          5082                  PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;          5083                  DODU_FLG = ONE;
;          5084                  end;
;          5085
;          5086              ENDSUB;
;          5087              end;
;          5088
;          5089          TST_PAT = not .TST_PAT;                 !REPEAT WITH A 0 IN A FIELD OF 1'S
;          5090          end;
;          5091
;          5092      TST_PAT = .TST_PAT^ONE;                     !SHIFT THE 1 IN THE FIELD OF 0'S
;          5093      end;
;          5094
;          5095  if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG IS SET
;          5096  then
;          5097      begin
;          5098      DODU (.ML_LUN);
;          5099      DOCLN;
;          5100      end;
;          5101
;          5102  ENDTST;
;
```

```
                                                                                                                    29-Mar-1982 16:23:04    TOPS
                                                                                                                    29-Mar-1982 16:21:03    PA:<
                                        ;ML4AD
                                        ;                TEST CODE SECTION
                                                 .SBTTL  $T6 TEST CODE SECTION
 9151 033022  004167  151564            $T6:     JSR     R1,$SAVE5                ;                                                  5001
 9152 033026  024646                             CMP     -(SP),-(SP)
 9153 033030  005067  162342                     CLR     P.CNT                    ;                                                  5044
 9154 033034  005005                             CLR     R5                       ; DODU.FLG                                         5047
 9155 033036  012703  000001                     MOV     #1,R3                    ; *,TST.PAT                                        5048
 9156 033042  005001                             CLR     R1                       ; SHIFT                                            5050
 9157 033044  005002                     1$:     CLR     R2                       ; TWICE                                            5053
 9158 033046  005004                     2$:     CLR     R4                       ; REG.SEL                                          5056
 9159 033050  104402                     3$:     TRAP    2                        ;                                                  5057
 9160 033052  152777  000040  162364            BISB    #40,@ML.REG+40           ;                                                  5058
 9161 033060  016700  162746                     MOV     ML.DUT,R0
 9162 033064  042700  177770                     BIC     #177770,R0
 9163 033070  142777  000007  162346            BICB    #7,@ML.REG+40
 9164 033076  150077  162342                     BISB    R0,@ML.REG+40
 9165 033102  010346                             MOV     R3,-(SP)                 ; TST.PAT,*                                        5060
 9166 033104  010446                             MOV     R4,-(SP)                 ; REG.SEL,*
 9167 033106  012746  000010                     MOV     #10,-(SP)
 9168 033112  060616                             ADD     SP,(SP)                  ; INDEX,*
 9169 033114  004767  172204                     JSR     PC,WRT.REG
 9170 033120  010316                             MOV     R3,(SP)                  ; TST.PAT,*                                        5061
 9171 033122  010446                             MOV     R4,-(SP)                 ; REG.SEL,*
 9172 033124  012746  000012                     MOV     #12,-(SP)
 9173 033130  060616                             ADD     SP,(SP)                  ; ERR.FLG,*
 9174 033132  004767  172554                     JSR     PC,RD.REG
 9175 033136  026627  000012  000001            CMP     12(SP),#1                ; ERR.FLG,*                                        5063
 9176 033144  001117                             BNE     8$
 9177 033146  005267  162224                     INC     P.CNT                    ;                                                  5065
 9178 033152  026767  162220  162220            CMP     P.CNT,LIMIT
 9179 033160  003403                             BLE     4$
 9180 033162  062706  000012                     ADD     #12,SP
 9181 033166  000513                             BR      9$
 9182 033170  005704                     4$:     TST     R4                       ; REG.SEL                                          5068
 9183 033172  002410                             BLT     5$
 9184 033174  020427  000003                     CMP     R4,#3                    ; REG.SEL,*
 9185 033200  003005                             BGT     5$
 9186 033202  104455                             TRAP    55                       ;                                                  5072
 9187 033204  000005                             .WORD   5
 9188 033206  012706                             .WORD   ASYNC
 9189 033210  026302                             .WORD   DUMPER
 9190 033212  000425                             BR      7$                       ;                                                  5068
 9191 033214  020427  000004            5$:      CMP     R4,#4                    ; REG.SEL,*
 9192 033220  002410                             BLT     6$
 9193 033222  020427  000005                     CMP     R4,#5                    ; REG.SEL,*
 9194 033226  003005                             BGT     6$
 9195 033230  104455                             TRAP    55                       ;                                                  5075
 9196 033232  000005                             .WORD   5
 9197 033234  012750                             .WORD   SYNC
 9198 033236  026302                             .WORD   DUMPER
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

033240  000412                                  BR      7$                      ;                                       5068
033242  020427  000006                  6$:     CMP     R4,#6                   ; REG.SEL,*
033246  002407                                  BLT     7$
033250  020427  000007                          CMP     R4,#7                   ; REG.SEL,*
033254  003004                                  BGT     7$
033256  104455                                  TRAP    55                      ;                                       5078
033260  000005                                  .WORD   5
033262  013012                                  .WORD   ARR.DAT
033264  026302                                  .WORD   DUMPER
033266  012746  011344                  7$:     MOV     #WRD.56,-(SP)           ;                                       5081
033272  012746  011310                          MOV     #WRD.52,-(SP)
033276  012746  012226                          MOV     #FNC.6,-(SP)
033302  012746  012216                          MOV     #FNC.5,-(SP)
033306  012746  010650                          MOV     #WRD.12,-(SP)
033312  012746  011676                          MOV     #PHR.4,-(SP)
033316  012746  010322                          MOV     #SIX.FMT,-(SP)
033322  012746  000007                          MOV     #7,-(SP)
033326  010600                                  MOV     SP,R0                   ; SP,*
033330  104414                                  TRAP    14
033332  016716  162014                          MOV     RD.DATA,(SP)            ;                                       5082
033336  016746  162006                          MOV     WT.DATA,-(SP)
033342  016600  000036                          MOV     36(SP),R0               ; INDEX,*
033346  006300                                  ASL     R0
033350  006300                                  ASL     R0
033352  006300                                  ASL     R0
033354  016046  015404                          MOV     ML.REG(R0),-(SP)
033360  012746  007436                          MOV     #FMT.16,-(SP)
033364  012746  000004                          MOV     #4,-(SP)
033370  010600                                  MOV     SP,R0                   ; SP,*
033372  104414                                  TRAP    14
033374  012705  000001                          MOV     #1,R5                   ; *,DODU.FLG                            5083
033400  062706  000030                          ADD     #30,SP                  ;                                       5065
033404  062706  000012                  8$:     ADD     #12,SP                  ;                                       5057
033410  104467                                  TRAP    67                      ;                                       5084
033412  006000                                  ROR     R0
033414  103615                                  BLO     3$
033416  005204                          9$:     INC     R4                      ; REG.SEL                               5056
033420  020427  000007                          CMP     R4,#7                   ; REG.SEL,*
033424  003611                                  BLE     3$
033426  005103                                  COM     R3                      ; TST.PAT                               5089
033430  005202                                  INC     R2                      ; TWICE                                 5053
033432  020227  000001                          CMP     R2,#1                   ; TWICE,*
033436  003603                                  BLE     2$
033440  006303                                  ASL     R3                      ; TST.PAT                               5092
033442  005201                                  INC     R1                      ; SHIFT                                 5050
033444  020127  000017                          CMP     R1,#17                  ; SHIFT,*
033450  003002                                  BGT     10$
033452  000167  177366                          JMP     1$
033456  005305                          10$:    DEC     R5                      ; DODU.FLG                              5095
033460  001004                                  BNE     11$
033462  016700  162342                          MOV     ML.LUN,R0               ;                                       5098
033466  104451                                  TRAP    51
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

033470  104444                                  TRAP    44
033472  022626                          11$:    CMP     (SP)+,(SP)+                     ;                                  5001
033474  000207                                  RTS     PC

                                        ; Routine Size:  150 words
                                        ; Maximum stack depth per invocation:  25 words



                                                .SBTTL  T6 TEST CODE SECTION
033476                                  T6::
033476  004767  177320                  1$:     JSR     PC,$T6                          ;                                  5100
033502  104466                                  TRAP    66
033504  006000                                  ROR     R0
033506  103773                                  BLO     1$
033510  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          5103  !
;          5104  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)

;          5105  !
;          5106  BGNTST;
;          5107
;          5108  !++
;          5109  ! TEST NUMBER:  TST 7
;          5110  !
;          5111  ! TEST NAME:    REGISTER INITIALIZATION TEST
;          5112  !
;          5113  ! TEST DESCRIPTION:
;          5114  !       THIS TEST TESTS THE ABILITY OF
;          5115  !       ALL ACCESSIBLE ML11 REGISTERS
;          5116  !       TO CLEAR OUT REGISTER DATA OF
;          5117  !       ONE'S AND ZEROES PATTERN.
;          5118  !
;          5119  !       ROUTINE WRT_REG WRITES A
;          5120  !       PATTERN TO THE SELECTED REGISTER.
;          5121  !
;          5122  !       A MASS BUS CLEAR IS DONE.
;          5123  !
;          5124  !       THEN ROUTINE RD_REG READS THE
;          5125  !       SELECTED REGISTER FOR CLEARED DATA
;          5126  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
;          5127  !
;          5128  !       THIS TEST WILL ALSO READ THE
;          5129  !       DRIVE TYPE REGISTER FOR ITS
;          5130  !       INITIAL REGISTER VALUE.
;          5131  !
;          5132  ! IMPLICIT INPUTS:
;          5133  !       THIS FLAG IS NEEDED DUE TO THE UNIQUE
;          5134  !       MANNER IN WHICH THESE REGISTERS
;          5135  !       MUST BE READ.
;          5136  !
;          5137  !       RD_DATA
;          5138  !       LOADED BY THE READ REGISTER ROUTINE
;          5139  !       AND CONTAINS THE DATA PATTERN READ FROM
;          5140  !       THE REGISTER (REPRESENTS BAD DATA).
;          5141  !
;          5142  !       DRIVE TYPE
;          5143  !       LOADED DURING THE INITIALIZATION CODE AND
;          5144  !       STORES THE EXPECTED CONTENTS OF THE DRIVE
;          5145  !       TYPE REGISTER.
;          5146  !--
;          5147
;          5148  local
;          5149      TST_PAT,                                  !TEST PATTERN
;          5150      ERR_FLG,                                  !ERROR FLAG PASSED TO ROUTINE
;          5151      index,                                    !POINTS TO REG PRESENTLY BEING TESTED
;          5152      CLR_DATA,                                 !STORES CALCULATED REGISTER CLEAR DATA
;          5153      SAVE,                                     !TEMPORARY STORAGE LOCATION
;          5154      DODU_FLG;                                 !DROP UNIT FLAG
;          5155
;          5156  CLR_THRESHOLD;                                !CLEAR ERROR PRINT THRESHOLD
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)
;
;          5157  ML_REG [19, FORCE_HI] = %o'177777';            !CLR DATA FOR MLPD IS ONES
;          5158  DODU_FLG = ZERO;
;          5159  TST_PAT = ONES;                                 !BACKGROUND PATTERN
;          5160
;          5161  incr TWICE from 0 to 1 do                      !REPEAT LOOP TWICE
;          5162      begin
;          5163
;          5164      incr REG_SEL from 0 to 10 do                !TEST THIRTEEN REGISTERS
;          5165          begin
;          5166          BGNSUB;
;          5167          CLR_MBUS;
;          5168          WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE REGISTER WITH BACKGROUND
;          5169          CLR_DATA = (.AI) or (.IGNORE);          !CALCULATE THE CLEARED DATA PATTERN
;          5170          CLR_MBUS;                               !CLEAR THE REGISTER
;          5171          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);  !READ THE REGISTER FOR THE CLEARED DATA PAT
;          5172
;          5173          if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
;          5174          then
;          5175              begin                               !IF ERROR FLAG IS SET THEN ERROR AND SET DODU_FLG
;          5176              CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;          5177
;          5178              selectone .REG_SEL of               !FIND WHICH MODULE FAILED
;          5179                  set
;          5180
;          5181                  [0, 1, 2, 3, 9, 10] :
;          5182                      ERRDF (6, ASYNC, DUMPER);   !ASYNC MODULE FAILURE
;          5183
;          5184                  [4, 5, 8] :
;          5185                      ERRDF (6, SYNC, DUMPER);    !SYNC MODULE FAILURE
;          5186
;          5187                  [6 to 7] :
;          5188                      ERRDF (6, ARR_DAT, DUMPER); !ARRAY DATA MODULE
;          5189                  tes;
;          5190
;          5191              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
;          5192              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
;          5193              DODU_FLG = ONE;
;          5194              end;
;          5195
;          5196          ENDSUB;
;          5197          end;
;          5198
;          5199      TST_PAT = not .TST_PAT;                     !REPEAT WITH COMPLIMENT BACKGROUND PAT
;          5200      end;
;          5201
;          5202  ML_REG [19, FORCE_HI] = ZEROES;                !RESTORE MLPD FORCED_HI
;          5203  !
;          5204  !
;          5205  !  NOW TEST THE DRIVE TYPE REGISTER
;          5206  !
;          5207  !
;          5208
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)

;          5209  if .MLDT neq .DRIVE_TYPE                                !COMPARE REG CONTENTS TO CALCULATED VALUE
;          5210  then
;          5211      begin
;          5212      ERRDF (113, ASYNC, DUMPER);
;          5213      PRINTB (TWO_FMT, REG_7, PHR_4);
;          5214      PRINTB (FMT_2, .DRIVE_TYPE, .SAVE);
;          5215      end;
;          5216
;          5217  if .DODU_FLG IS_SET                                     !DROP THIS UNIT IF DODU_FLG IS_SET
;          5218  then
;          5219      begin
;          5220      DODU (.ML_LUN);
;          5221      DOCLN;
;          5222      end;
;          5223
;          5224  ENDTST;

                                        .SBTTL  $T7 TEST CODE SECTION
033512  004167  151074          $T7:    JSR     R1,$SAVE5                       ;                                   5102
033516  162706  000006                  SUB     #6,SP
033522  005067  161650                  CLR     P.CNT                           ;                                   5154
033526  012767  177777  162102          MOV     #-1,ML.REG+232                  ;                                   5157
033534  005005                          CLR     R5                              ; DODU.FLG                          5158
033536  012702  177777                  MOV     #-1,R2                          ; *,TST.PAT                         5159
033542  005001                          CLR     R1                              ; TWICE                             5161
033544  005004                  1$:     CLR     R4                              ; REG.SEL                           5164
033546  104402                  2$:     TRAP    2                               ;                                   5165
033550  152777  000040  161666          BISB    #40,@ML.REG+40                  ;                                   5166
033556  016703  162250                  MOV     ML.DUT,R3
033562  042703  177770                  BIC     #177770,R3
033566  142777  000007  161650          BICB    #7,@ML.REG+40
033574  150377  161644                  BISB    R3,@ML.REG+40
033600  010246                          MOV     R2,-(SP)                        ; TST.PAT,*                         5168
033602  010446                          MOV     R4,-(SP)                        ; REG.SEL,*
033604  012746  000012                  MOV     #12,-(SP)
033610  060616                          ADD     SP,(SP)                         ; INDEX,*
033612  004767  171506                  JSR     PC,WRT.REG
033616  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                           5169
033622  006300                          ASL     R0
033624  006300                          ASL     R0
033626  006300                          ASL     R0
033630  010003                          MOV     R0,R3
033632  016300  015406                  MOV     ML.REG+2(R3),R0
033636  056300  015412                  BIS     ML.REG+6(R3),R0
033642  010066  000006                  MOV     R0,6(SP)                        ; *,CLR.DATA
033646  152777  000040  161570          BISB    #40,@ML.REG+40
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

033654  016700  162152                          MOV     ML.DUT,R0
033660  042700  177770                          BIC     #177770,R0
033664  142777  000007  161552                  BICB    #7,@ML.REG+40
033672  150077  161546                          BISB    R0,@ML.REG+40
033676  016616  000006                          MOV     6(SP),(SP)                      ; CLR.DATA,*                    5171
033702  010446                                  MOV     R4,-(SP)                        ; REG.SEL,*
033704  012746  000014                          MOV     #14,-(SP)
033710  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
033712  004767  171774                          JSR     PC,RD.REG
033716  026627  000014  000001                  CMP     14(SP),#1                       ; ERR.FLG,*                     5173
033724  001121                                  BNE     11$
033726  005267  161444                          INC     P.CNT                           ;                               5175
033732  026767  161440  161440                  CMP     P.CNT,LIMIT
033740  003403                                  BLE     3$
033742  062706  000012                          ADD     #12,SP
033746  000517                                  BR      13$
033750  005704                          3$:     TST     R4                              ; REG.SEL                       5178
033752  002403                                  BLT     4$
033754  020427  000003                          CMP     R4,#3                           ; REG.SEL,*
033760  003406                                  BLE     5$
033762  020427  000011                  4$:     CMP     R4,#11                          ; REG.SEL,*
033766  002410                                  BLT     6$
033770  020427  000012                          CMP     R4,#12                          ; REG.SEL,*
033774  003005                                  BGT     6$
033776  104455                          5$:     TRAP    55                              ;                               5182
034000  000006                                  .WORD   6
034002  012706                                  .WORD   ASYNC
034004  026302                                  .WORD   DUMPER
034006  000430                                  BR      10$                             ;                               5178
034010  020427  000004                  6$:     CMP     R4,#4                           ; REG.SEL,*
034014  002403                                  BLT     7$
034016  020427  000005                          CMP     R4,#5                           ; REG.SEL,*
034022  003403                                  BLE     8$
034024  020427  000010                  7$:     CMP     R4,#10                          ; REG.SEL,*
034030  001005                                  BNE     9$
034032  104455                          8$:     TRAP    55                              ;                               5185
034034  000006                                  .WORD   6
034036  012750                                  .WORD   SYNC
034040  026302                                  .WORD   DUMPER
034042  000412                                  BR      10$                             ;                               5178
034044  020427  000006                  9$:     CMP     R4,#6                           ; REG.SEL,*
034050  002407                                  BLT     10$
034052  020427  000007                          CMP     R4,#7                           ; REG.SEL,*
034056  003004                                  BGT     10$
034060  104455                                  TRAP    55                              ;                               5188
034062  000006                                  .WORD   6
034064  013012                                  .WORD   ARR.DAT
034066  026302                                  .WORD   DUMPER
034070  012746  011344                  10$:    MOV     #WRD.56,-(SP)                   ;                               5191
034074  012746  012464                          MOV     #FNC.23,-(SP)
034100  012746  011310                          MOV     #WRD.52,-(SP)
034104  012746  010650                          MOV     #WRD.12,-(SP)
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

034110  012746  011676                          MOV     #PHR.4,-(SP)
034114  012746  010304                          MOV     #FIV.FMT,-(SP)
034120  012746  000006                          MOV     #6,-(SP)
034124  010600                                  MOV     SP,R0                   ; SP,*
034126  104414                                  TRAP    14
034130  016716  161216                          MOV     RD.DATA,(SP)            ;                                       5192
034134  016646  000030                          MOV     30(SP),-(SP)            ; CLR.DATA,*
034140  016346  015404                          MOV     ML.REG(R3),-(SP)
034144  012746  007436                          MOV     #FMT.16,-(SP)
034150  012746  000004                          MOV     #4,-(SP)
034154  010600                                  MOV     SP,R0                   ; SP,*
034156  104414                                  TRAP    14
034160  012705  000001                          MOV     #1,R5                   ; *,DODU.FLG                            5193
034164  062706  000026                          ADD     #26,SP                  ;                                       5175
034170  062706  000012                  11$:    ADD     #12,SP                  ;                                       5165
034174  104467                                  TRAP    67                      ;                                       5194
034176  006000                                  ROR     R0
034200  103002                                  BHIS    13$
034202  000167  177340                  12$:    JMP     2$
034206  005204                          13$:    INC     R4                      ; REG.SEL                               5164
034210  020427  000012                          CMP     R4,#12                  ; REG.SEL,*
034214  003772                                  BLE     12$
034216  005102                                  COM     R2                      ; TST.PAT                               5199
034220  005201                                  INC     R1                      ; TWICE                                 5161
034222  020127  000001                          CMP     R1,#1                   ; TWICE,*
034226  003002                                  BGT     14$
034230  000167  177310                          JMP     1$
034234  005067  161376                  14$:    CLR     ML.REG+232              ;                                       5202
034240  027767  161270  161106                  CMP     @ML.REG+130,DRIVE.TYPE  ;                                       5209
034246  001431                                  BEQ     15$
034250  104455                                  TRAP    55                      ;                                       5212
034252  000161                                  .WORD   161
034254  012706                                  .WORD   ASYNC
034256  026302                                  .WORD   DUMPER
034260  012746  011676                          MOV     #PHR.4,-(SP)            ;                                       5213
034264  012746  012546                          MOV     #REG.7,-(SP)
034270  012746  010246                          MOV     #TWO.FMT,-(SP)
034274  012746  000003                          MOV     #3,-(SP)
034300  010600                                  MOV     SP,R0                   ; SP,*
034302  104414                                  TRAP    14
034304  010416                                  MOV     R4,(SP)                 ; SAVE,*                                5214
034306  016746  161042                          MOV     DRIVE.TYPE,-(SP)
034312  012746  006506                          MOV     #FMT.2,-(SP)
034316  012746  000003                          MOV     #3,-(SP)
034322  010600                                  MOV     SP,R0                   ; SP,*
034324  104414                                  TRAP    14
034326  062706  000016                          ADD     #16,SP                  ;                                       5211
034332  005305                          15$:    DEC     R5                      ; DODU.FLG                              5217
034334  001004                                  BNE     16$
034336  016700  161466                          MOV     ML.LUN,R0               ;                                       5220
034342  104451                                  TRAP    51
034344  104444                                  TRAP    44
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

034346  062706  000006                  16$:    ADD     #6,SP                           ;                                       5102
034352  000207                                  RTS     PC

                                        ; Routine Size:  209 words
                                        ; Maximum stack depth per invocation:  25 words



                                                .SBTTL  T7 TEST CODE SECTION
034354                                  T7::
034354  004767  177132                  1$:     JSR     PC,$T7                          ;                                       5222
034360  104466                                  TRAP    66
034362  006000                                  ROR     R0
034364  103773                                  BLO     1$
034366  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          5225  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (60)

;                !
;                !
;                !
;                BGNTST;
;
;                !++
;                ! TEST NUMBER:  TST 8
;                !
;                ! TEST NAME:    REGISTER SELECTION TEST
;                !
;                ! TEST DESCRIPTION:
;                !       THIS TEST TESTS FOR UNIQUE REGISTER
;                !       SELECTION BY FIRST WRITING A BACKGROUND
;                !       PATTERN INTO ALL READ/WRITE REGISTERS
;                !
;                !       IT THEN WRITES A COMPLIMENT
;                !       BACKGROUND PATTERN INTO ONE REGISTER
;                !       AND READS THE REMAINING UNWRITTEN
;                !       REGISTERS FOR AN UNCHANGED BACKGROUND
;                !       PAT
;                !
;                !       THIS PROCEDURE IS REPEATED UNTIL ALL
;                !       REGISTERS HAVE BEEN WRITTEN WITH A
;                !       COMPLIMENT BACKGROUND PATTERN.
;                !
;                !--
;
;                local
;                    DODU_FLG,                                  !DROP UNIT FLAG
;                    TST_PAT,                                   !TEST PATTERN
;                    ERR_FLG,                                   !ERROR FLAG PASSED TO ROUTINE;
;                    index;                                     !POINTS TO REGISTER PRESENTLY BEING TESTED.
;
;                CLR_THRESHOLD;                                 !CLEAR ERROR PRINT THRESHOLD
;                BGNSUB;
;                CLR_MBUS;
;                DODU_FLG = ZERO;
;                TST_PAT = %o'125252';                          !LOAD TST_PAT WITH ALTERNATE 1'S & 0'S
;                WRT_CS1 (.TST_PAT, 0);                         !WRITE A BACKGROUND INTO ALL THE DIRECTLY
;                WRT_ER (.TST_PAT, 6);                          !ACCESSABLE READ WRITE REGISTERS
;                WRT_DA (.TST_PAT, 3);
;                WRT_PA (.TST_PAT, 8);
;                WRT_E1 (.TST_PAT, 13);
;                WRT_E2 (.TST_PAT, 14);
;
;                incr CNT_1 from 0 to 4 do                      !WRITE A COMPLIMENT PATTERN INTO ONE REGISTER
;                    begin
;                    TST_PAT = not .TST_PAT;                    !GENERATE THE COMPLIMENT PAT
;
;                    case .CNT_1 from 0 to 4 of                 !SELECT THE REGISTER TO WRITE INTO
;                        set
;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (60)
;
;          5278          [0] :
;          5279              WRT_CS1 (.TST_PAT, 0);              !FIRST PASS WRITE COMP PAT TO MLCS1
;          5280
;          5281          [1] :
;          5282              WRT_ER (.TST_PAT, 6);               !SECOND PASS WRITE COMP PAT TO MLER
;          5283
;          5284          [2] :
;          5285              WRT_DA (.TST_PAT, 3);               !THIRD PASS WRITE COMP PAT TO MLDA
;          5286
;          5287          [3] :
;          5288              WRT_PA (.TST_PAT, 8);               !FORTH PASS WRITE COMP PAT TO MLPA
;          5289
;          5290          [4] :
;          5291              WRT_E1 (.TST_PAT, 13);              !FIFTH PASS WRITE COMP PAT TO MLE1
;          5292          tes;
;          5293
;          5294      TST_PAT = not .TST_PAT;                     !COMPLIMENT TST_PAT BACK TO BACKGROUND
;          5295
;          5296      incr CNT_2 from .CNT_1 + 1 to 5 do          !NOW READ THE REMAINING UNWRITTEN REGISTERS FOR AN
;          5297          begin                                   !UNCHANGED BACKGROUND
;          5298
;          5299          case .CNT_2 from 0 to 5 of              !SELECT THE REGISTER TO READ
;          5300              set
;          5301
;          5302              [0] :
;          5303                  RD_CS1 (.TST_PAT, index = 0, ERR_FLG);  !READ MLCS1
;          5304
;          5305              [1] :
;          5306                  RD_ER (.TST_PAT, index = 6, ERR_FLG);   !READ MLER
;          5307
;          5308              [2] :
;          5309                  RD_DA (.TST_PAT, index = 3, ERR_FLG);   !READ MLDA
;          5310
;          5311              [3] :
;          5312                  RD_PA (.TST_PAT, index = 8, ERR_FLG);   !READ MLPA
;          5313
;          5314              [4] :
;          5315                  RD_E1 (.TST_PAT, index = 13, ERR_FLG);  !READ MLE1
;          5316
;          5317              [5] :
;          5318                  RD_E2 (.TST_PAT, index = 14, ERR_FLG);  !READ MLE2
;          5319              tes;
;          5320
;          5321          if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
;          5322          then
;          5323              begin
;          5324              CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;          5325
;          5326              selectone .CNT_2 of
;          5327                  set
;          5328
;          5329                  [0 to 2] :
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (60)

;                                ERRDF (110, ASYNC, DUMPER); !ASYNC MODULE FAILURE

;                            [3 to 5]
;                                ERRDF (110, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
;                            tes;

;                        PRINTB (THR_FMT, WRD_38, WRD_37, WRD_10);
;                        PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;                        DODU_FLG = ONE;
;                        end;

;                    end;

;                end;

;            ENDSUB;

;            if .DODU_FLG IS_SET                                !DROP THIS UNIT IF DODU_FLG IS_SET
;            then
;                begin
;                DODU (.ML_LUN);
;                DOCLN;
;                end;

;            ENDTST;

                                        .SBTTL  $T8 TEST CODE SECTION
034370  004167  150216          $T8:    JSR     R1,$SAVE5                   ;                                5224
034374  005746                          TST     -(SP)
034376  005067  160774                  CLR     P.CNT                       ;                                5257
034402  104402                  1$:     TRAP    2                           ;                                5259
034404  152777  000040  161032          BISB    #40,@ML.REG+40              ;                                5260
034412  016703  161414                  MOV     ML.DUT,R3
034416  042703  177770                  BIC     #177770,R3
034422  142777  000007  161014          BICB    #7,@ML.REG+40
034430  150377  161010                  BISB    R3,@ML.REG+40
034434  005005                          CLR     R5                          ; DODU.FLG                       5262
034436  012704  125252                  MOV     #-52526,R4                  ; *,TST.PAT                      5263
034442  010446                          MOV     R4,-(SP)                    ; TST.PAT,*                      5264
034444  005046                          CLR     -(SP)
034446  004767  165240                  JSR     PC,WRT.CS1
034452  010416                          MOV     R4,(SP)                     ; TST.PAT,*                      5265
034454  012746  000006                  MOV     #6,-(SP)
034460  004767  165404                  JSR     PC,WRT.ER
034464  010416                          MOV     R4,(SP)                     ; TST.PAT,*                      5266
034466  012746  000003                  MOV     #3,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

034472  004767  165550                          JSR     PC,WRT.DA
034476  010416                                  MOV     R4,(SP)                 ; TST.PAT,*                     5267
034500  012746  000010                          MOV     #10,-(SP)
034504  004767  166072                          JSR     PC,WRT.PA
034510  010416                                  MOV     R4,(SP)                 ;   T.PAT,*                     5268
034512  012746  000015                          MOV     #15,-(SP)
034516  004767  166266                          JSR     PC,WRT.E1
034522  010416                                  MOV     R4,(SP)                 ; TST.PAT,*                     5269
034524  012746  000016                          MOV     #16,-(SP)
034530  004767  166462                          JSR     PC,WRT.E2
034534  005001                                  CLR     R1                      ; CNT.1                         5271
034536  005104                          2$:     COM     R4                      ; TST.PAT                       5273
034540  010103                                  MOV     R1,R3                   ; CNT.1,*                       5275
034542  006303                                  ASL     R3
034544  066307  034550                          ADD     3$(R3),PC
034550  000012                          3$:     .WORD   4$-3$
034552  000024                                  .WORD   5$-3$
034554  000040                                  .WORD   6$-3$
034556  000054                                  .WORD   7$-3$
034560  000070                                  .WORD   8$-3$
034562  010446                          4$:     MOV     R4,-(SP)                ; TST.PAT,*                     5279
034564  005046                                  CLR     -(SP)
034566  004767  165120                          JSR     PC,WRT.CS1
034572  000427                                  BR      9$                      ;                               5275
034574  010446                          5$:     MOV     R4,-(SP)                ; TST.PAT,*                     5282
034576  012746  000006                          MOV     #6,-(SP)
034602  004767  165262                          JSR     PC,WRT.ER
034606  000421                                  BR      9$                      ;                               5275
034610  010446                          6$:     MOV     R4,-(SP)                ; TST.PAT,*                     5285
034612  012746  000003                          MOV     #3,-(SP)
034616  004767  165424                          JSR     PC,WRT.DA
034622  000413                                  BR      9$                      ;                               5275
034624  010446                          7$:     MOV     R4,-(SP)                ; TST.PAT,*                     5288
034626  012746  000010                          MOV     #10,-(SP)
034632  004767  165744                          JSR     PC,WRT.PA
034636  000405                                  BR      9$                      ;                               5275
034640  010446                          8$:     MOV     R4,-(SP)                ; TST.PAT,*                     5291
034642  012746  000015                          MOV     #15,-(SP)
034646  004767  166136                          JSR     PC,WRT.E1
034652  005104                          9$:     COM     R4                      ; TST.PAT                       5294
034654  010103                                  MOV     R1,R3                   ; CNT.1,CNT.2                   5296
034656  000167  000416                          JMP     23$
034662  010300                          10$:    MOV     R3,R0                   ; CNT.2,*                       5299
034664  006300                                  ASL     R0
034666  066007  034672                          ADD     11$(R0),PC
034672  000014                          11$:    .WORD   12$-11$
034674  000036                                  .WORD   13$-11$
034676  000062                                  .WORD   14$-11$
034700  000106                                  .WORD   15$-11$
034702  000132                                  .WORD   16$-11$
034704  000156                                  .WORD   17$-11$
034706  010446                          12$:    MOV     R4,-(SP)                ; TST.PAT,*                     5303
```

```
                                                                                                    29-Mar-1982 16:23:04    TOPS
                                                                                                    29-Mar-1982 16:21:03    PA:<
                                        ;ML4AD
                                        ;                TEST CODE SECTION
                                                 CLR     R2                      ; INDEX
                                                 CLR     -(SP)
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.CS1
                                                 BR      18$                     ;                                       5299
                                        13$:     MOV     R4,-(SP)                ; TST.PAT,*                             5306
                                                 MOV     #6,R2                   ; *,INDEX
                                                 MOV     R2,-(SP)                ; INDEX,*
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.ER
                                                 BR      18$                     ;                                       5299
                                        14$:     MOV     R4,-(SP)                ; TST.PAT,*                             5309
                                                 MOV     #3,R2                   ; *,INDEX
                                                 MOV     R2,-(SP)                ; INDEX,*
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.DA
                                                 BR      18$                     ;                                       5299
                                        15$:     MOV     R4,-(SP)                ; TST.PAT,*                             5312
                                                 MOV     #10,R2                  ; *,INDEX
                                                 MOV     R2,-(SP)                ; INDEX,*
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.PA
                                                 BR      18$                     ;                                       5299
                                        16$:     MOV     R4,-(SP)                ; TST.PAT,*                             5315
                                                 MOV     #15,R2                  ; *,INDEX
                                                 MOV     R2,-(SP)                ; INDEX,*
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.E1
                                                 BR      18$                     ;                                       5299
                                        17$:     MOV     R4,-(SP)                ; TST.PAT,*                             5318
                                                 MOV     #16,R2                  ; *,INDEX
                                                 MOV     R2,-(SP)                ; INDEX,*
                                                 MOV     #30,-(SP)
                                                 ADD     SP,(SP)                 ; ERR.FLG,*
                                                 JSR     PC,RD.E2
                                        18$:     CMP     30(SP),#1               ; ERR.FLG,*                             5321
                                                 BNE     22$
                                                 INC     P.CNT                   ;                                       5323
                                                 CMP     P.CNT,LIMIT
                                                 BLE     19$
                                                 ADD     #6,SP
                                                 BR      24$
                                        19$:     TST     R3                      ; CNT.2                                 5326
                                                 BLT     20$
                                                 CMP     R3,#2                   ; CNT.2,*
                                                 BGT     20$
                                                 TRAP    55                      ;                                       5330
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

035140  000156                                  .WORD   156
035142  012706                                  .WORD   ASYNC
035144  026302                                  .WORD   DUMPER
035146  000412                                  BR      21$                     ;                                       5326
035150  020327  000003                  20$:    CMP     R3,#3                   ; CNT.2,*
035154  002407                                  BLT     21$
035156  020327  000005                          CMP     R3,#5                   ; CNT.2,*
035162  003004                                  BGT     21$
035164  104455                                  TRAP    55                      ;                                       5333
035166  000156                                  .WORD   156
035170  013012                                  .WORD   ARR.DAT
035172  026302                                  .WORD   DUMPER
035174  012746  010630                  21$:    MOV     #WRD.10,-(SP)           ;                                       5336
035200  012746  011122                          MOV     #WRD.37,-(SP)
035204  012746  011132                          MOV     #WRD.38,-(SP)
035210  012746  010256                          MOV     #THR.FMT,-(SP)
035214  012746  000004                          MOV     #4,-(SP)
035220  010600                                  MOV     SP,R0                   ; SP,*
035222  104414                                  TRAP    14
035224  016716  160122                          MOV     RD.DATA,(SP)            ;                                       5337
035230  016746  160114                          MOV     WT.DATA,-(SP)
035234  010200                                  MOV     R2,R0                   ; INDEX,*
035236  006300                                  ASL     R0
035240  006300                                  ASL     R0
035242  006300                                  ASL     R0
035244  016046  015404                          MOV     ML.REG(R0),-(SP)
035250  012746  007436                          MOV     #FMT.16,-(SP)
035254  012746  000004                          MOV     #4,-(SP)
035260  010600                                  MOV     SP,R0                   ; SP,*
035262  104414                                  TRAP    14
035264  012705  000001                          MOV     #1,R5                   ; *,DODU.FLG                            5338
035270  062706  000022                          ADD     #22,SP                  ;                                       5323
035274  062706  000006                  22$:    ADD     #6,SP                   ;                                       5297
035300  005203                          23$:    INC     R3                      ; CNT.2                                 5296
035302  020327  000005                          CMP     R3,#5                   ; CNT.2,*
035306  003002                                  BGT     24$
035310  000167  177346                          JMP     10$
035314  022626                          24$:    CMP     (SP)+,(SP)+             ;                                       5272
035316  005201                                  INC     R1                      ; CNT.1                                 5271
035320  020127  000004                          CMP     R1,#4                   ; CNT.1,*
035324  003002                                  BGT     25$
035326  000167  177204                          JMP     2$
035332  062706  000016                  25$:    ADD     #16,SP                  ;                                       5259
035336  104467                                  TRAP    67                      ;                                       5343
035340  006000                                  ROR     R0
035342  103002                                  BHIS    26$
035344  000167  177032                          JMP     1$
035350  005305                          26$:    DEC     R5                      ; DODU.FLG                              5347
035352  001004                                  BNE     27$
035354  016700  160450                          MOV     ML.LUN,R0               ;                                       5350
035360  104451                                  TRAP    51
035362  104444                                  TRAP    44
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        27$:    TST     (SP)+                           ;                               5224
035366  000207                                RTS     PC
                                        ; Routine Size:  256 words
                                        ; Maximum stack depth per invocation:  28 words
                                                .SBTTL  T8 TEST CODE SECTION
035370                                  T8::
035370  004767  176774                  1$:     JSR     PC,$T8                          ;                               5352
035374  104466                                  TRAP    66
035376  006000                                  ROR     R0
035400  103773                                  BLO     1$
035402  000207                                  RTS     PC
                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
;       5355  !<BLF/PAGE>
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (61)

;          5356  !
;          5357  !
;          5358  BGNTST;
;          5359
;          5360  !++
;          5361  ! TEST NUMBER:  TST 9
;          5362  !
;          5363  ! TEST NAME:    PRINT SERIAL NUMBER
;          5364  !
;          5365  ! TEST DESCRIPTION:
;          5366  !       UPON A YES RESPONSE TO THE
;          5367  !       SOFTWARE QUESTION 'PRINT SERIAL NO?
;          5368  !       PRINT OUT THE DRIVE UNDER TEST
;          5369  !       SERIAL NUMBER.
;          5370  !
;          5371  !--
;          5372
;          5373  local
;          5374      D3,                                                 !STORES DIGIT 3 OF SERIAL NUMBER
;          5375      D2,                                                 !STORES DIGIT 2 OF SERIAL NUMBER
;          5376      D1,                                                 !STORES DIGIT 1 OF SERIAL NUMBER
;          5377      D0;                                                 !STORES DIGIT 0 OF SERIAL NUMBER
;          5378
;          5379  if .PRSN IS_SET                                         !SEE IF WE PRINT THE SERIAL NUMBER
;          5380  then
;          5381      begin                                               !PRINT THE SERIAL NUMBER IF THE REPLY WAS YES
;          5382      D3 = .SN3;                                          !LOAD DIGIT 3 OF SN INTO D3
;          5383      D2 = .SN2;                                          !LOAD DIGIT 2 OF SN INTO D2
;          5384      D1 = .SN1;                                          !LOAD DIGIT 1 OF SN INTO D1
;          5385      D0 = .SN0;                                          !LOAD DIGIT 0 OF SN INTO D0
;          5386
;          5387      if ((.D3 gtr 9) or (.D2 gtr 9) or (.D1 gtr 9) or (.D0 gtr 9))
;          5388                                                          !SEE IF DIGITS ARE TO BIG FOR COVERSION
;          5389      then
;          5390          PRINTB (FMT_25, PHR_15, .MLSN)                  !PRINT OCTAL SN IF TO BIG
;          5391      else
;          5392          PRINTB (FMT_26, PHR_15, .D3, .D2, .D1, .D0);    !ELSE PRINT DECIMAL SERIAL NUMBER
;          5393
;          5394      end;
;          5395
;          5396  ENDTST;

                                        .SBTTL  $T9 TEST CODE SECTION
035404  004167  147144          $T9:    JSR     R1,$SAVE3                   ;                                   5354
035410  026727  144764  000001          CMP     PRSN,#1                     ;                                   5379
035416  001101                          BNE     4$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

035420  017703  160120                          MOV     @ML.REG+140,R3                  ; *,D3                          5382
035424  006203                                  ASR     R3                              ; D3
035426  006203                                  ASR     R3                              ; D3
035430  006203                                  ASR     R3                              ; D3
035432  006203                                  ASR     R3                              ; D3
035434  000303                                  SWAB    R3                              ; D3
035436  042703  177760                          BIC     #177760,R3                      ; *,D3
035442  017700  160076                          MOV     @ML.REG+140,R0                  ; *,D2                          5383
035446  000300                                  SWAB    R0                              ; D2
035450  042700  177760                          BIC     #177760,R0                      ; *,D2
035454  117701  160064                          MOVB    @ML.REG+140,R1                  ; *,D1                          5384
035460  006201                                  ASR     R1                              ; D1
035462  006201                                  ASR     R1                              ; D1
035464  006201                                  ASR     R1                              ; D1
035466  006201                                  ASR     R1                              ; D1
035470  042701  177760                          BIC     #177760,R1                      ; *,D1
035474  117702  160044                          MOVB    @ML.REG+140,R2                  ; *,D0                          5385
035500  042702  177760                          BIC     #177760,R2                      ; *,D0
035504  020327  000011                          CMP     R3,#11                          ; D3,*                          5387
035510  003011                                  BGT     1$
035512  020027  000011                          CMP     R0,#11                          ; D2,*
035516  003006                                  BGT     1$
035520  020127  000011                          CMP     R1,#11                          ; D1,*
035524  003003                                  BGT     1$
035526  020227  000011                          CMP     R2,#11                          ; D0,*
035532  003413                                  BLE     2$
035534  017746  160004                  1$:     MOV     @ML.REG+140,-(SP)               ;                               5390
035540  012746  012136                          MOV     #PHR.15,-(SP)
035544  012746  010166                          MOV     #FMT.25,-(SP)
035550  012746  000003                          MOV     #3,-(SP)
035554  010600                                  MOV     SP,R0                           ; SP,*
035556  104414                                  TRAP    14
035560  000416                                  BR      3$                              ;                               5387
035562  010246                          2$:     MOV     R2,-(SP)                        ; D0,*                          5392
035564  010146                                  MOV     R1,-(SP)                        ; D1,*
035566  010046                                  MOV     R0,-(SP)                        ; D2,*
035570  010346                                  MOV     R3,-(SP)                        ; D3,*
035572  012746  012136                          MOV     #PHR.15,-(SP)
035576  012746  010206                          MOV     #FMT.26,-(SP)
035602  012746  000006                          MOV     #6,-(SP)
035606  010600                                  MOV     SP,R0                           ; SP,*
035610  104414                                  TRAP    14
035612  062706  000006                          ADD     #6,SP
035616  062706  000010                  3$:     ADD     #10,SP                          ;                               5381
035622  000207                          4$:     RTS     PC                              ;                               5354

                                        ; Routine Size:  72 words
                                        ; Maximum stack depth per invocation:  11 words
```

```
10103 ;ML4AD
10104 ;                 TEST CODE SECTION
10105
10109
10110                                           .SBTTL  T9 TEST CODE SECTION
10114 035624                            T9::
10115 035624  004767  177554            1$:     JSR     PC,$T9                  ;                       5394
10116 035630  104466                            TRAP    66
10117 035632  006000                            ROR     R0
10118 035634  103773                            BLO     1$
10119 035636  000207                            RTS     PC
10120
10121                                   ; Routine Size:  6 words
10122                                   ; Maximum stack depth per invocation:  0 words
10127
10128
10129 ;         5397  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (62)

;               !
;               !
;               BGNTST;

;               !++
;               ! TEST NUMBER:  TST 10
;               !
;               ! TEST NAME:    C-BUS PARITY TEST
;               !
;               ! TEST DESCRIPTION:
;               !       TEST THE CONTROL BUS PARITY
;               !       DETECTION AND GENERATING BY:
;               !
;               !       1.  WRITING BAD PARITY TO DEVICE
;               !           AND TEST CPAR SET.
;               !
;               !       2.  WRITING GOOD PARITY TO DEVICE
;               !           AND TEST CPAR CLR.
;               !
;               !       3.  READING DEVICE AND TEST GOOD
;               !           PARITY GENERATION BY READING
;               !           MCPE CLR.
;               !
;               !--

;               local
;                   SAVE,                                 !TEMPORARY SAVE LOCATION
;                   TST_PAT;                              !TEST PATTERN

;               if .PAR_DIS IS_NOT_SET                    !SEE IF PARITY IS DISABLED
;               then
;                   begin                                 !BEGIN IF PARITY IS ENABLE
;                   TST_PAT = %o'125252';                 !ALTERNATING 1, 0 PATTERN

;                   incr TWICE from 1 to 2 do             !REPEAT LOOP TWICE
;                       begin
;                       CLR_MBUS;
;                       PAT = ONE;                        !GENERATE EVEN PARITY BY SETTING THE PAT BIT
;                       MLDA = .TST_PAT;                  !WRITE BAD PARITY ON CONTROL BUS

;                       if .CPAR IS_NOT_SET               !READ CPAR BIT SET
;                       then
;                           begin
;                           ERRDF (7, ASYNC, DUMPER);     !ERROR IF NOT SET
;                           PRINTB (THR_FMT, WRD_5, WRD_7, WRD_9);
;                           end;

;                       CLR_MBUS;                         !CLEAR OUT PAT BIT
;                       MLDA = .TST_PAT;                  !WRITE ODD PARITY CONTROL BUS

;                       if .CPAR IS_SET                   !READ CPAR BIT CLEARED
;                       then
```

```
10187 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10188 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (62)
10189 ;
10190 ;          5450           begin
10191 ;          5451           ERRDF (8, ASYNC, DUMPER);               !ERROR IF SET
10192 ;          5452           PRINTB (THR_FMT, WRD_6, WRD_7, WRD_9);
10193 ;          5453           end;
10194 ;          5454
10195 ;          5455       CLR_MBUS;
10196 ;          5456       SAVE = .MLDA;                           !READ A REGISTER FROM DUT
10197 ;          5457
10198 ;          5458       if .MCPE IS_SET                         !SEE IF GENERATED GOOD PARITY
10199 ;          5459       then
10200 ;          5460           begin
10201 ;          5461           ERRDF (9, ASYNC, DUMPER);           !ERROR IF MCPE IS_SET
10202 ;          5462           PRINTB (THR_FMT, WRD_6, WRD_7, WRD_8);
10203 ;          5463           end;
10204 ;          5464
10205 ;          5465       TST_PAT = .TST_PAT^ONE;                 !REPEAT WITH SHIFTED DATA
10206 ;          5466       end;
10207 ;          5467
10208 ;          5468   end
10209 ;          5469 else
10210 ;          5470   PRINTB (TWO_FMT, WRD_7, WRD_53);            !JUST PRINT MESSAGE IF PARITY IS DISABLED
10211 ;          5471
10212 ;          5472 ENDTST;
10216
10217                                          .SBTTL  $T10 TEST CODE SECTION
10221 035640  004167  146710          $T10:   JSR     R1,$SAVE3                ;                          5396
10222 035644  005767  156140                  TST     PAR.DIS                  ;                          5427
10223 035650  001171                          BNE     5$
10224 035652  012701  125252                  MOV     #-52526,R1               ; *,TST.PAT                5430
10225 035656  012702  000001                  MOV     #1,R2                    ; *,TWICE                  5432
10226 035662  152777  000040  157554  1$:     BISB    #40,@ML.REG+40           ;                          5433
10227 035670  016700  160136                  MOV     ML.DUT,R0
10228 035674  042700  177770                  BIC     #177770,R0
10229 035700  142777  000007  157536          BICB    #7,@ML.REG+40
10230 035706  150077  157532                  BISB    R0,@ML.REG+40
10231 035712  152777  000020  157524          BISB    #20,@ML.REG+40           ;                          5435
10232 035720  010177  157510                  MOV     R1,@ML.REG+30            ; TST.PAT,*                5436
10233 035724  132777  000010  157532          BITB    #10,@ML.REG+60           ;                          5438
10234 035732  001022                          BNE     2$
10235 035734  104455                          TRAP    55                       ;                          5441
10236 035736  000007                          .WORD   7
10237 035740  012706                          .WORD   ASYNC
10238 035742  026302                          .WORD   DUMPER
10239 035744  012746  010616                  MOV     #WRD.9,-(SP)             ;                          5442
10240 035750  012746  010566                  MOV     #WRD.7,-(SP)
10241 035754  012746  010552                  MOV     #WRD.5,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<

035760  012746  010256                          MOV     #THR.FMT,-(SP)
035764  012746  000004                          MOV     #4,-(SP)
035770  010600                                  MOV     SP,R0                   ; SP,*
035772  104414                                  TRAP    14
035774  062706  000012                          ADD     #12,SP                  ;                                       5440
036000  152777  000040  157436  2$:             BISB    #40,@ML.REG+40          ;                                       5443
036006  016700  160020                          MOV     ML.DUT,R0
036012  042700  177770                          BIC     #177770,R0
036016  142777  000007  157420                  BICB    #7,@ML.REG+40
036024  150077  157414                          BISB    R0,@ML.REG+40
036030  010177  157400                          MOV     R1,@ML.REG+30           ; TST.PAT,*                             5446
036034  132777  000010  157422                  BITB    #10,@ML.REG+60          ;                                       5448
036042  001422                                  BEQ     3$
036044  104455                                  TRAP    55                      ;                                       5451
036046  000010                                  .WORD   10
036050  012706                                  .WORD   ASYNC
036052  026302                                  .WORD   DUMPER
036054  012746  010616                          MOV     #WRD.9,-(SP)            ;                                       5452
036060  012746  010566                          MOV     #WRD.7,-(SP)
036064  012746  010560                          MOV     #WRD.6,-(SP)
036070  012746  010256                          MOV     #THR.FMT,-(SP)
036074  012746  000004                          MOV     #4,-(SP)
036100  010600                                  MOV     SP,R0                   ; SP,*
036102  104414                                  TRAP    14
036104  062706  000012                          ADD     #12,SP                  ;                                       5450
036110  152777  000040  157326  3$:             BISB    #40,@ML.REG+40          ;                                       5453
036116  016700  157710                          MOV     ML.DUT,R0
036122  042700  177770                          BIC     #177770,R0
036126  142777  000007  157310                  BICB    #7,@ML.REG+40
036134  150077  157304                          BISB    R0,@ML.REG+40
036140  017703  157270                          MOV     @ML.REG+30,R3           ; *,SAVE                                5456
036144  032777  020000  157232                  BIT     #20000,@ML.REG          ;                                       5458
036152  001422                                  BEQ     4$
036154  104455                                  TRAP    55                      ;                                       5461
036156  000011                                  .WORD   11
036160  012706                                  .WORD   ASYNC
036162  026302                                  .WORD   DUMPER
036164  012746  010602                          MOV     #WRD.8,-(SP)            ;                                       5462
036170  012746  010566                          MOV     #WRD.7,-(SP)
036174  012746  010560                          MOV     #WRD.6,-(SP)
036200  012746  010256                          MOV     #THR.FMT,-(SP)
036204  012746  000004                          MOV     #4,-(SP)
036210  010600                                  MOV     SP,R0                   ; SP,*
036212  104414                                  TRAP    14
036214  062706  000012                          ADD     #12,SP                  ;                                       5460
036220  006301                  4$:             ASL     R1                      ; TST.PAT                               5465
036222  005202                                  INC     R2                      ; TWICE                                 5432
036224  020227  000002                          CMP     R2,#2                   ; TWICE,*
036230  003614                                  BLE     1$
036232  000207                                  RTS     PC                      ;                                       5427
036234  012746  011316          5$:             MOV     #WRD.53,-(SP)           ;                                       5470
036240  012746  010566                          MOV     #WRD.7,-(SP)
```

```
10299                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
10300                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
10301
10302 036244  012746  010246                    MOV     #TWO.FMT,-(SP)
10303 036250  012746  000003                    MOV     #3,-(SP)
10304 036254  010600                            MOV     SP,R0                           ; SP,*
10305 036256  104414                            TRAP    14
10306 036260  062706  000010                    ADD     #10,SP
10307 036264  000207                            RTS     PC                              ;                       5396
10308
10309                                   ; Routine Size:  139 words
10310                                   ; Maximum stack depth per invocation:  9 words
10315
10316
10320
10321                                           .SBTTL  T10 TEST CODE SECTION
10325 036266                            T10::
10326 036266  004767  177346            1$:     JSR     PC,$T10                         ;                       5470
10327 036272  104466                            TRAP    66
10328 036274  006000                            ROR     R0
10329 036276  103773                            BLO     1$
10330 036300  000207                            RTS     PC
10331
10332                                   ; Routine Size:  6 words
10333                                   ; Maximum stack depth per invocation:  0 words
10338
10339
10340 ;         5473  !<BLF/PAGE>
```

```
10342 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10343 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (63)
10344
10345 ;          5474  !
10346 ;          5475  !
10347 ;          5476  BGNTST;
10348 ;          5477
10349 ;          5478  !++
10350 ;          5479  ! TEST NUMBER:  TST 11
10351 ;          5480  !
10352 ;          5481  ! TEST NAME:    MEMORY SIZING TEST
10353 ;          5482  !
10354 ;          5483  ! TEST DESCRIPTION:
10355 ;          5484  !
10356 ;          5485  !       THIS TESTS THE ML11'S SIZING
10357 ;          5486  !       LOGIC BY COMPARING THE
10358 ;          5487  !       OPERATORS INPUTED NUMBER OF ARRAYS
10359 ;          5488  !       PRESENT TO THE ML11 SIZING
10360 ;          5489  !       NUMBER OF ARRAYS PRESENT
10361 ;          5490  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
10362 ;          5491  ! IMPLICIT INPUTS:
10363 ;          5492  !
10364 ;          5493  !       OP_NUM_ARR:
10365 ;          5494  !       LOADED DURING INIT CODE AND
10366 ;          5495  !       STORES OPERATORS INPUT TO THE
10367 ;          5496  !       SOFTWARE QUESTION:
10368 ;          5497  !       NUMBER OF ARRAYS PRESENT?
10369 ;          5498  !
10370 ;          5499  !
10371 ;          5500  !--
10372 ;          5501
10373 ;          5502  BGNSUB;
10374 ;          5503  CLR_MBUS;
10375 ;          5504
10376 ;          5505  if (.OP_NUM_ARR + 1) neq .ML_NUM_ARR          !SEE IF DRIVE SIZED SAME NO. OF ARRAYS AS OP INPUTED
10377 ;          5506  then
10378 ;          5507      begin
10379 ;          5508      ERRDF (10, ASYNC, DUMPER);                !IF NOT EQL THEN ERROR AND SET DODU_FLG
10380 ;          5509      PRINTB (TWO_FMT, FNC_1, WRD_14);
10381 ;          5510      PRINTB (FMT_2, (.OP_NUM_ARR + 1), .ML_NUM_ARR);
10382 ;          5511      end;
10383 ;          5512
10384 ;          5513  ENDSUB;
10385 ;          5514  ENDTST;
10389
10390                                       .SBTTL  $T11 TEST CODE SECTION
10394 036302  004167  146232          $T11:  JSR     R1,$SAVE2                ;                              5472
10395 036306  104402                  1$:    TRAP    2                        ;                              5476
10396 036310  152777  000040  157126        BISB    #40,@ML.REG+40           ;                              5502
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

036316  016700  157510                          MOV     ML.DUT,R0
036322  042700  177770                          BIC     #177770,R0
036326  142777  000007  157110                  BICB    #7,@ML.REG+40
036334  150077  157104                          BISB    R0,@ML.REG+40
036340  016700  155436                          MOV     OP.NUM.ARR,R0                   ;                                       5505
036344  005200                                  INC     R0
036346  017702  157152                          MOV     @ML.REG+120,R2
036352  006202                                  ASR     R2
036354  006202                                  ASR     R2
036356  006202                                  ASR     R2
036360  000302                                  SWAB    R2
036362  042702  177740                          BIC     #177740,R2
036366  010001                                  MOV     R0,R1
036370  020102                                  CMP     R1,R2
036372  001442                                  BEQ     2$
036374  104455                                  TRAP    55                              ;                                       5508
036376  000012                                  .WORD   12
036400  012706                                  .WORD   ASYNC
036402  026302                                  .WORD   DUMPER
036404  012746  010664                          MOV     #WRD.14,-(SP)                   ;                                       5509
036410  012746  012150                          MOV     #FNC.1,-(SP)
036414  012746  010246                          MOV     #TWO.FMT,-(SP)
036420  012746  000003                          MOV     #3,-(SP)
036424  010600                                  MOV     SP,R0                           ; SP,*
036426  104414                                  TRAP    14
036430  017702  157070                          MOV     @ML.REG+120,R2                  ;                                       5510
036434  006202                                  ASR     R2
036436  006202                                  ASR     R2
036440  006202                                  ASR     R2
036442  000302                                  SWAB    R2
036444  042702  177740                          BIC     #177740,R2
036450  010216                                  MOV     R2,(SP)
036452  016746  155324                          MOV     OP.NUM.ARR,-(SP)
036456  005216                                  INC     (SP)
036460  012746  006506                          MOV     #FMT.2,-(SP)
036464  012746  000003                          MOV     #3,-(SP)
036470  010600                                  MOV     SP,R0                           ; SP,*
036472  104414                                  TRAP    14
036474  062706  000016                          ADD     #16,SP                          ;                                       5507
036500  104467                          2$:     TRAP    67                              ;                                       5511
036502  006000                                  ROR     R0
036504  103700                                  BLO     1$
036506  000207                                  RTS     PC                              ;                                       5472

                                        ; Routine Size:  67 words
                                        ; Maximum stack depth per invocation:  10 words
```

```
10459
10460                                   .SBTTL  T11 TEST CODE SECTION
10464 036510                    T11::
10465 036510  004767  177566    1$:     JSR     PC,$T11                 ;       5513
10466 036514  104466                    TRAP    66
10467 036516  006000                    ROR     R0
10468 036520  103773                    BLO     1$
10469 036522  000207                    RTS     PC
10470
10471                           ; Routine Size:  6 words
10472                           ; Maximum stack depth per invocation:  0 words
10477
10478
10479 ;          5515  !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (64)

;          5516  !
;          5517  !
;          5518  BGNTST;
;          5519
;          5520  !++
;          5521  ! TEST NUMBER:  TST 12
;          5522  !
;          5523  ! TEST NAME:    NO-OP FUNCTION TEST
;          5524  !
;          5525  ! TEST DESCRIPTION:
;          5526  !
;          5527  !       TEST IF THE DRIVE CAN PERFORM
;          5528  !       A NO_OP FUNCTION WITH OUT
;          5529  !       HANGING THE DRIVE.
;          5530  !
;          5531  !       A NO_OP FUNCTION IS WRITTEN
;          5532  !       INTO MLCS1.
;          5533  !       THEN GO AND ERROR BITS ARE
;          5534  !       CHECKED FOR CORRECT STATES.
;          5535  !
;          5536  !       THIS UNIT IS DROPPED ON DETECTED
;          5537  !       ERRORS.
;          5538  !
;          5539  ! IMPLICIT INPUTS:      NONE
;          5540  !
;          5541  !
;          5542  !--
;          5543
;          5544  BGNSUB;
;          5545  CLR_MBUS;
;          5546  MLCS1 = NOOP;                          !DO A NOOP FUNCTION
;          5547  DELAY (ONE_US);                        !DELAY 1 US
;          5548
;          5549  if .GO IS_SET                         !SEE IF GO STILL SET
;          5550  then
;          5551      begin
;          5552      ERRDF (11, ASYNC, DUMPER);         !ERROR AND SET DODU_FLG IF STILL SET
;          5553      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_2, WRD_19);
;          5554      end;
;          5555
;          5556  if .ILF IS_SET                         !SEE ILF SET
;          5557  then
;          5558      begin
;          5559      ERRDF (12, ASYNC, DUMPER);         !ERROR AND SET DODU_FLG IF SET
;          5560      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_2, WRD_19);
;          5561      end;
;          5562
;          5563  if .OPI IS_SET                         !SEE IF CPI SET
;          5564  then
;          5565      begin
;          5566      ERRDF (13, ASYNC, DUMPER);         !ERROR AND SET DODU_FLG IF SET
;          5567      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_2, WRD_19);
```

```
10537 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10538 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (64)
10539
10540 ;          5568      end;
10541 ;          5569
10542 ;          5570  ENDSUB;
10543 ;          5571  ENDTST;
10547
10548                                          .SBTTL  $T12 TEST CODE SECTION
10552 036524  010146                  $T12:   MOV     R1,-(SP)                ;                               5514
10553 036526  005746                          TST     -(SP)
10554 036530  104402                  1$:     TRAP    2                       ;                               5518
10555 036532  152777  C00040  156704          BISB    #40,@ML.REG+40          ;                               5544
10556 036540  016701  157266                  MOV     ML.DUT,R1
10557 036544  042701  177770                  BIC     #177770,R1
10558 036550  142777  000007  156666          BICB    #7,@ML.REG+40
10559 036556  150177  156662                  BISB    R1,@ML.REG+40
10560 036562  012777  000001  156614          MOV     #1,@ML.REG              ;                               5546
10561 036570  012700  000001                  MOV     #1,R0                   ; *,$$TMP2                      5547
10562 036574  001410                  2$:     BEQ     5$
10563 036576  016701  143314                  MOV     L$DLY,R1                ; *,$$TMP1
10564 036602  001403                          BEQ     4$
10565 036604  005016                  3$:     CLR     (SP)                    ; $$TMP
10566 036606  005301                          DEC     R1                      ; $$TMP1
10567 036610  001375                          BNE     3$
10568 036612  005300                  4$:     DEC     R0                      ; $$TMP2
10569 036614  000767                          BR      2$
10570 036616  132777  000001  156560  5$:     BITB    #1,@ML.REG              ;                               5549
10571 036624  001426                          BEQ     6$
10572 036626  104455                          TRAP    55                      ;                               5552
10573 036630  000013                          .WORD   13
10574 036632  012706                          .WORD   ASYNC
10575 036634  026302                          .WORD   DUMPER
10576 036636  012746  010730                  MOV     #WRD.19,-(SP)           ;                               5553
10577 036642  012746  012164                  MOV     #FNC.2,-(SP)
10578 036646  012746  010640                  MOV     #WRD.11,-(SP)
10579 036652  012746  011626                  MOV     #PHR.2,-(SP)
10580 036656  012746  010520                  MOV     #WRD.1,-(SP)
10581 036662  012746  010304                  MOV     #FIV.FMT,-(SP)
10582 036666  012746  000006                  MOV     #6,-(SP)
10583 036672  010600                          MOV     SP,R0                   ; SP,*
10584 036674  104414                          TRAP    14
10585 036676  062706  000016                  ADD     #16,SP                  ;                               5551
10586 036702  132777  000001  156554  6$:     BITB    #1,@ML.REG+60           ;                               5556
10587 036710  001426                          BEQ     7$
10588 036712  104455                          TRAP    55                      ;                               5559
10589 036714  000014                          .WORD   14
10590 036716  012706                          .WORD   ASYNC
10591 036720  026302                          .WORD   DUMPER
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

036722  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       5560
036726  012746  012164                          MOV     #FNC.2,-(SP)
036732  012746  010640                          MOV     #WRD.11,-(SP)
036736  012746  011714                          MOV     #PHR.5,-(SP)
036742  012746  010536                          MOV     #WRD.3,-(SP)
036746  012746  010304                          MOV     #FIV.FMT,-(SP)
036752  012746  000006                          MOV     #6,-(SP)
036756  010600                                  MOV     SP,R0                           ; SP,*
036760  104414                                  TRAP    14
036762  062706  000016                          ADD     #16,SP                          ;                                       5558
036766  032777  020000  156470  7$:             BIT     #20000,@ML.REG+60               ;                                       5563
036774  001426                                  BEQ     8$
036776  104455                                  TRAP    55                              ;                                       5566
037000  000015                                  .WORD   15
037002  012706                                  .WORD   ASYNC
037004  026302                                  .WORD   DUMPER
037006  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       5567
037012  012746  012164                          MOV     #FNC.2,-(SP)
037016  012746  010640                          MOV     #WRD.11,-(SP)
037022  012746  011714                          MOV     #PHR.5,-(SP)
037026  012746  010544                          MOV     #WRD.4,-(SP)
037032  012746  010304                          MOV     #FIV.FMT,-(SP)
037036  012746  000006                          MOV     #6,-(SP)
037042  010600                                  MOV     SP,R0                           ; SP,*
037044  104414                                  TRAP    14
037046  062706  000016                          ADD     #16,SP                          ;                                       5565
037052  104467                          8$:     TRAP    67                              ;                                       5568
037054  006000                                  ROR     R0
037056  103624                                  BLO     1$
037060  005726                                  TST     (SP)+                           ;                                       5514
037062  012601                                  MOV     (SP)+,R1
037064  000207                                  RTS     PC

                                        ; Routine Size:  113 words
                                        ; Maximum stack depth per invocation:  9 words



                                                .SBTTL  T12 TEST CODE SECTION
037066                                  T12::
037066  004767  177432                  1$:     JSR     PC,$T12                         ;                                       5570
037072  104466                                  TRAP    66
```

```
10649                                   ;ML4AD
10650                                   ;               TEST CODE SECTION
10651
10652 037074  006000                              ROR     R0
10653 037076  103773                              BLO     1$
10654 037100  000207                              RTS     PC
10655
10656                                   ; Routine Size:  6 words
10657                                   ; Maximum stack depth per invocation:  0 words
10662
10663
10664 ;          5572  !<BLF/PAGE>
```

```
10666 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10667 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)
10668 ;
10669 ;          5573  !
10670 ;          5574  !
10671 ;          5575  BGNTST;
10672 ;          5576
10673 ;          5577  !++
10674 ;          5578  ! TEST NUMBER:  TST 13
10675 ;          5579  !
10676 ;          5580  ! TEST NAME:    WRITE CHECK FUNCTION TEST
10677 ;          5581  !
10678 ;          5582  ! TEST DESCRIPTION:
10679 ;          5583  !
10680 ;          5584  !       TEST IF THE DRIVE CAN PERFORM
10681 ;          5585  !       A WRITE CHECK FUNCTION WITHOUT
10682 ;          5586  !       HANGING THE DRIVE.
10683 ;          5587  !
10684 ;          5588  !       A WRITE CHECK FUNCTION IS WRITTEN
10685 ;          5589  !       INTO MLCS1.
10686 ;          5590  !       THEN GO AND ERROR BITS ARE
10687 ;          5591  !       CHECKED FOR CORRECT STATES
10688 ;          5592  !
10689 ;          5593  !--
10690 ;          5594
10691 ;          5595  local
10692 ;          5596      DODU_FLG;                             !DROP UNIT FLAG
10693 ;          5597
10694 ;          5598  BGNSUB;
10695 ;          5599  CLR_MBUS;
10696 ;          5600  DODU_FLG = ZERO;
10697 ;          5601  FIRST_BLK_XFER ();                        !SET UP A FIRST BLK XFERR
10698 ;          5602  MLCS1 = WRT_CHK;                          !DO A WRITE CHECK FUNCTION
10699 ;          5603
10700 ;          5604  if .GO IS_NOT_SET                         !SEE IF THE GO BIT GOT SET
10701 ;          5605  then
10702 ;          5606      begin
10703 ;          5607      ERRDF (14, ASYNC, DUMPER);            !ERROR IF NOT SET
10704 ;          5608      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_4, WRD_19);
10705 ;          5609
10706 ;          5610      if .DRY IS_NOT_SET                    !SEE IF THE DRY IS SET WHILE GO IS CLEARED
10707 ;          5611      then
10708 ;          5612          begin
10709 ;          5613          ERRDF (15, ASYNC, DUMPER);        !ERROR IF CLEARED
10710 ;          5614          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
10711 ;          5615          end;
10712 ;          5616
10713 ;          5617      DODU_FLG = ONE;                       !SET DODU_FLG
10714 ;          5618      end
10715 ;          5619  else
10716 ;          5620
10717 ;          5621      if .DRY IS_SET                        !THE GO IS SET SO SEE IF DRY IS CLEARED
10718 ;          5622      then
10719 ;          5623          begin
10720 ;          5624          ERRDF (16, ASYNC, DUMPER);        !ERROR IF DRY IS SET
```

```
10722 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10723 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)
10724 ;
10725 ;          5625           PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
10726 ;          5626           DODU_FLG = ONE;
10727 ;          5627           end;
10728 ;          5628
10729 ;          5629   if .ILF IS_SET                           !SEE IF ILF IS SET
10730 ;          5630   then
10731 ;          5631       begin
10732 ;          5632       ERRDF (17, ASYNC, DUMPER);           !ERROR IF SET
10733 ;          5633       PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_4, WRD_19);
10734 ;          5634       end;
10735 ;          5635
10736 ;          5636   if .OPI IS_SET                           !SEE IF OPI IS SET
10737 ;          5637   then
10738 ;          5638       begin
10739 ;          5639       ERRDF (18, ASYNC, DUMPER);           !ERROR IF SET
10740 ;          5640       PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_4, WRD_19);
10741 ;          5641       end;
10742 ;          5642
10743 ;          5643   DELAY (FRTY_US);                         !WAIT FO XFERR TO COMPLTE
10744 ;          5644
10745 ;          5645   if .DRY IS_NOT_SET                       !SEE IF DRY IS SETS AFTER XFERR
10746 ;          5646   then
10747 ;          5647       begin
10748 ;          5648
10749 ;          5649       if .GO IS_SET                        !IF DRY IS NOT SET THEN SEE IF GO IS SET
10750 ;          5650       then
10751 ;          5651           begin
10752 ;          5652           CLR_MBUS;                        !IF THE GO IS SET THEN TRY TO CLR GO
10753 ;          5653
10754 ;          5654           if .GO IS_SET then ERRDF (19, ASYNC, DUMPER) else ERRDF (20, SYNC, DUMPER);
10755 ;          5655
10756 ;          5656                                            !IF GO IS STILL SET THEN ASYNC FAILURE
10757 ;          5657           PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);  !ELSE SYNC MODLE FAILURE
10758 ;          5658           end
10759 ;          5659       else
10760 ;          5660           begin
10761 ;          5661           ERRDF (21, ASYNC, DUMPER);       !ERROR GO AND DRY BOTH CLEARED
10762 ;          5662           PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_4, WRD_19);
10763 ;          5663           end;
10764 ;          5664
10765 ;          5665       DODU_FLG = ONE;                      !SET THE DODU_FLG
10766 ;          5666       end;
10767 ;          5667
10768 ;          5668   if .GO IS_SET                            !SEE IF THE GO IS STILL SET
10769 ;          5669   then
10770 ;          5670       begin
10771 ;          5671       CLR_MBUS;                            !TRY TO CLR GO IF STILL SET
10772 ;          5672
10773 ;          5673       if .GO IS_SET then ERRDF (22, ASYNC, DUMPER) else ERRDF (23, SYNC, DUMPER);
10774 ;          5674
10775 ;          5675                                            !IF GO IS STILL SET THE ASYNC FAILURE
10776 ;          5676       PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);      !ELSE SYNC MODULE FAILURE
```

```
10778 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
10779 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)
10780
10781 ;          5677      DODU_FLG = ONE;
10782 ;          5678      end;
10783 ;          5679
10784 ;          5680  ENDSUB;
10785 ;          5681
10786 ;          5682  if .DODU_FLG IS_SET                       !DROP THIS UNIT IF DODU_FLG IS_SET
10787 ;          5683  then
10788 ;          5684      begin
10789 ;          5685      DODU (.ML_LUN);
10790 ;          5686      DOCLN;
10791 ;          5687      end;
10792 ;          5688
10793 ;          5689  ENDTST;
10797
10798                                          .SBTTL  $T13 TEST CODE SECTION
10802 037102  004167  145432          $T13:   JSR     R1,$SAVE2                ;                              5571
10803 037106  005746                          TST     -(SP)
10804 037110  104402                  1$:     TRAP    2                        ;                              5596
10805 037112  152777  000040  156324          BISB    #40,@ML.REG+40           ;                              5598
10806 037120  016701  156706                  MOV     ML.DUT,R1
10807 037124  042701  177770                  BIC     #177770,R1
10808 037130  142777  000007  156306          BICB    #7,@ML.REG+40
10809 037136  150177  156302                  BISB    R1,@ML.REG+40
10810 037142  005002                          CLR     R2                       ; DODU.FLG                     5600
10811 037144  004767  161112                  JSR     PC,FIRST.BLK.XFER        ;                              5601
10812 037150  012777  000051  156226          MOV     #51,@ML.REG              ;                              5602
10813 037156  132777  000001  156220          BITB    #1,@ML.REG               ;                              5604
10814 037164  001057                          BNE     2$
10815 037166  104455                          TRAP    55                       ;                              5607
10816 037170  000016                          .WORD   16
10817 037172  012706                          .WORD   ASYNC
10818 037174  026302                          .WORD   DUMPER
10819 037176  012746  010730                  MOV     #WRD.19,-(SP)            ;                              5608
10820 037202  012746  012200                  MOV     #FNC.4,-(SP)
10821 037206  012746  010650                  MOV     #WRD.12,-(SP)
10822 037212  012746  011610                  MOV     #PHR.1,-(SP)
10823 037216  012746  010520                  MOV     #WRD.1,-(SP)
10824 037222  012746  010304                  MOV     #FIV.FMT,-(SP)
10825 037226  012746  000006                  MOV     #6,-(SP)
10826 037232  010600                          MOV     SP,R0                    ; SP,*
10827 037234  104414                          TRAP    14
10828 037236  132777  000200  156210          BITB    #200,@ML.REG+50          ;                              5610
10829 037244  001056                          BNE     3$
10830 037246  104455                          TRAP    55                       ;                              5613
10831 037250  000017                          .WORD   17
10832 037252  012706                          .WORD   ASYNC
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

037254  026302                                  .WORD   DUMPER
037256  012746  011726                          MOV     #PHR.6,-(SP)                    ;                                5614
037262  012746  010520                          MOV     #WRD.1,-(SP)
037266  012746  011176                          MOV     #WRD.43,-(SP)
037272  012746  011610                          MOV     #PHR.1,-(SP)
037276  012746  010524                          MOV     #WRD.2,-(SP)
037302  012746  010304                          MOV     #FIV.FMT,-(SP)
037306  012746  000006                          MOV     #6,-(SP)
037312  010600                                  MOV     SP,R0                           ; SP,*
037314  104414                                  TRAP    14
037316  062706  000016                          ADD     #16,SP                          ;                                5612
037322  000427                                  BR      3$                              ;                                5617
037324  105777  156124                  2$:     TSTB    @ML.REG+50                      ;                                5621
037330  100030                                  BPL     4$
037332  104455                                  TRAP    55                              ;                                5624
037334  000020                                  .WORD   20
037336  012706                                  .WORD   ASYNC
037340  026302                                  .WORD   DUMPER
037342  012746  011714                          MOV     #PHR.5,-(SP)                    ;                                5625
037346  012746  010520                          MOV     #WRD.1,-(SP)
037352  012746  011176                          MOV     #WRD.43,-(SP)
037356  012746  011626                          MOV     #PHR.2,-(SP)
037362  012746  010524                          MOV     #WRD.2,-(SP)
037366  012746  010304                          MOV     #FIV.FMT,-(SP)
037372  012746  000006                          MOV     #6,-(SP)
037376  010600                                  MOV     SP,R0                           ; SP,*
037400  104414                                  TRAP    14
037402  012702  000001                  3$:     MOV     #1,R2                           ; *,DODU.FLG                     5626
037406  062706  000016                          ADD     #16,SP                          ;                                5623
037412  132777  000001  156044          4$:     BITB    #1,@ML.REG+60                   ;                                5629
037420  001426                                  BEQ     5$
037422  104455                                  TRAP    55                              ;                                5632
037424  000021                                  .WORD   21
037426  012706                                  .WORD   ASYNC
037430  026302                                  .WORD   DUMPER
037432  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5633
037436  012746  012200                          MOV     #FNC.4,-(SP)
037442  012746  010650                          MOV     #WRD.12,-(SP)
037446  012746  011714                          MOV     #PHR.5,-(SP)
037452  012746  010536                          MOV     #WRD.3,-(SP)
037456  012746  010304                          MOV     #FIV.FMT,-(SP)
037462  012746  000006                          MOV     #6,-(SP)
037466  010600                                  MOV     SP,R0                           ; SP,*
037470  104414                                  TRAP    14
037472  062706  000016                          ADD     #16,SP                          ;                                5631
037476  032777  020000  155760          5$:     BIT     #20000,@ML.REG+60               ;                                5636
037504  001426                                  BEQ     6$
037506  104455                                  TRAP    55                              ;                                5639
037510  000022                                  .WORD   22
037512  012706                                  .WORD   ASYNC
037514  026302                                  .WORD   DUMPER
037516  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5640
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

037522  012746  012200                          MOV     #FNC.4,-(SP)
037526  012746  010650                          MOV     #WRD.12,-(SP)
037532  012746  011714                          MOV     #PHR.5,-(SP)
037536  012746  010544                          MOV     #WRD.4,-(SP)
037542  012746  010304                          MOV     #FIV.FMT,-(SP)
037546  012746  000006                          MOV     #6,-(SP)
037552  010600                                  MOV     SP,R0                   ; SP,*
037554  104414                                  TRAP    14
037556  062706  000016                          ADD     #16,SP                  ;                                       5638
037562  012700  000050                  6$:     MOV     #50,R0                  ; *,$$TMP2                              5643
037566  001410                          7$:     BEQ     10$
037570  016701  142322                          MOV     L$DLY,R1                ; *,$$TMP1
037574  001403                                  BEQ     9$
037576  005016                          8$:     CLR     (SP)                    ; $$TMP
037600  005301                                  DEC     R1                      ; $$TMP1
037602  001375                                  BNE     8$
037604  005300                          9$:     DEC     R0                      ; $$TMP2
037606  000767                                  BR      7$
037610  132777  000200  155636          10$:    BITB    #200,@ML.REG+50         ;                                       5645
037616  001106                                  BNE     15$
037620  132777  000001  155556                  BITB    #1,@ML.REG              ;                                       5649
037626  001452                                  BEQ     13$
037630  152777  000040  155606                  BISB    #40,@ML.REG+40          ;                                       5651
037636  016701  156170                          MOV     ML.DUT,R1
037642  042701  177770                          BIC     #177770,R1
037646  142777  000007  155570                  BICB    #7,@ML.REG+40
037654  150177  155564                          BISB    R1,@ML.REG+40
037660  132777  000001  155516                  BITB    #1,@ML.REG              ;                                       5654
037666  001405                                  BEQ     11$
037670  104455                                  TRAP    55
037672  000023                                  .WORD   23
037674  012706                                  .WORD   ASYNC
037676  026302                                  .WORD   DUMPER
037700  000404                                  BR      12$
037702  104455                          11$:    TRAP    55
037704  000024                                  .WORD   24
037706  012750                                  .WORD   SYNC
037710  026302                                  .WORD   DUMPER
037712  012746  010730                  12$:    MOV     #WRD.19,-(SP)           ;                                       5657
037716  012746  012200                          MOV     #FNC.4,-(SP)
037722  012746  010640                          MOV     #WRD.11,-(SP)
037726  012746  011626                          MOV     #PHR.2,-(SP)
037732  012746  010520                          MOV     #WRD.1,-(SP)
037736  012746  010304                          MOV     #FIV.FMT,-(SP)
037742  012746  000006                          MOV     #6,-(SP)
037746  010600                                  MOV     SP,R0                   ; SP,*
037750  104414                                  TRAP    14
037752  000424                                  BR      14$                     ;                                       5649
037754  104455                          13$:    TRAP    55                      ;                                       5661
037756  000025                                  .WORD   25
037760  012706                                  .WORD   ASYNC
037762  026302                                  .WORD   DUMPER
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
                                        MOV     #WRD.19,-(SP)           ;                                       5662
                                        MOV     #FNC.4,-(SP)
                                        MOV     #WRD.11,-(SP)
                                        MOV     #PHR.1,-(SP)
                                        MOV     #WRD.2,-(SP)
                                        MOV     #FIV.FMT,-(SP)
                                        MOV     #6,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                14$:    MOV     #1,R2                   ; *,DODU.FLG                            5665
                                        ADD     #16,SP                  ;                                       5647
                        155342  15$:    BITB    #1,@ML.REG              ;                                       5668
                                        BEQ     18$
                        155372          BISB    #40,@ML.REG+40          ;                                       5670
                                        MOV     ML.DUT,R1
                                        BIC     #177770,R1
                        155354          BICB    #7,@ML.REG+40
                                        BISB    R1,@ML.REG+40
                        155302          BITB    #1,@ML.REG              ;                                       5673
                                        BEQ     16$
                                        TRAP    55
                                        .WORD   26
                                        .WORD   ASYNC
                                        .WORD   DUMPER
                                        BR      17$
                                16$:    TRAP    55
                                        .WORD   27
                                        .WORD   SYNC
                                        .WORD   DUMPER
                                17$:    MOV     #WRD.19,-(SP)           ;                                       5676
                                        MOV     #FNC.4,-(SP)
                                        MOV     #WRD.11,-(SP)
                                        MOV     #PHR.2,-(SP)
                                        MOV     #WRD.1,-(SP)
                                        MOV     #FIV.FMT,-(SP)
                                        MOV     #6,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     #1,R2                   ; *,DODU.FLG                            5677
                                        ADD     #16,SP                  ;                                       5670
                                18$:    TRAP    67                      ;                                       5678
                                        ROR     R0
                                        BHIS    19$
                                        JMP     1$
                                19$:    DEC     R2                      ; DODU.FLG                              5682
                                        BNE     20$
                                        MOV     ML.LUN,R0               ;                                       5685
                                        TRAP    51
                                        TRAP    44
                                20$:    TST     (SP)+                   ;                                       5571
                                        RTS     PC
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
                                ;
                                ; Routine Size:  299 words
                                ; Maximum stack depth per invocation:  18 words
                                ;
                                ;
                                ;
                                        .SBTTL  T13 TEST CODE SECTION
040230                          T13::
040230  004767  176646          1$:     JSR     PC,$T13                 ;       5687
040234  104466                          TRAP    66
040236  006000                          ROR     R0
040240  103773                          BLO     1$
040242  000207                          RTS     PC
                                ;
                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
                                ;
                                ;
;       5690  !<BLF/PAGE>
```

```
11038 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
11039 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)
11040 
11041 ;          5691  !
11042 ;          5692  BGNTST;
11043 ;          5693
11044 ;          5694  !++
11045 ;          5695  ! TEST NUMBER:  TST 14
11046 ;          5696  !
11047 ;          5697  ! TEST NAME:    WRITE FUNCTION TEST
11048 ;          5698  !
11049 ;          5699  ! TEST DESCRIPTION:
11050 ;          5700  !       TEST IF THE DRIVE CAN PERFORM A WRITE FUNCTION WITHOUT
11051 ;          5701  !       HANGING THE DRIVE.
11052 ;          5702  !
11053 ;          5703  !       A WRITE FUNCTION IS WRITTEN INTO MLCS1.  THEN GO AND ERROR BITS ARE
11054 ;          5704  !       CHECKED FOR CORRECT STATUS.  THIS UNIT IS DROPPED ON DETECTED ERRORS.
11055 ;          5705  !--
11056 ;          5706
11057 ;          5707  local
11058 ;          5708      DODU_FLG;                                   !DROP UNIT FLAG
11059 ;          5709
11060 ;          5710  BGNSUB;
11061 ;          5711  CLR_MBUS;
11062 ;          5712  DODU_FLG = ZERO;
11063 ;          5713  FIRST_BLK_XFER ();                            !SET UP A FIRST BLOCK XFERR
11064 ;          5714  MLCS1 = write;                                !DO A WRITE FUNCTION
11065 ;          5715
11066 ;          5716  if .GO IS_NOT_SET                             !SEE IF THE GO IS SET
11067 ;          5717  then
11068 ;          5718      begin                                     !ERROR IF NOT SET
11069 ;          5719      ERRDF (24, ASYNC, DUMPER);
11070 ;          5720      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_5, WRD_19);
11071 ;          5721
11072 ;          5722      if .DRY IS_NOT_SET                        !SEE IF DRY SET WITH GO CLEAR
11073 ;          5723      then
11074 ;          5724          begin
11075 ;          5725          ERRDF (25, ASYNC, DUMPER);
11076 ;          5726          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
11077 ;          5727          end;
11078 ;          5728
11079 ;          5729      DODU_FLG = ONE;                           !SET DODU_FLG
11080 ;          5730      end
11081 ;          5731  else                                          !GO IS SET DURING FUNCTION
11082 ;          5732
11083 ;          5733      if .DRY IS_SET                            !SEE IF DRY CLEAR WITH GO SET
11084 ;          5734      then
11085 ;          5735          begin                                 !ERROR IF SET
11086 ;          5736          ERRDF (26, ASYNC, DUMPER);
11087 ;          5737          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
11088 ;          5738          DODU_FLG = ONE;
11089 ;          5739          end;
11090 ;          5740
11091 ;          5741  if .ILF IS_SET                               !DID FUNCTION CAUSE ILF
11092 ;          5742  then
```

```
11094 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 BLiss-16 V2(212)
11095 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)
11096 ;
11097 ;          5743       begin                                !ERROR IF YES
11098 ;          5744       ERRDF (27, ASYNC, DUMPER);
11099 ;          5745       PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_5, WRD_19);
11100 ;          5746       end;
11101 ;          5747
11102 ;          5748   if .OPI IS_SET                           !DID FUNCTION CAUSE OPI
11103 ;          5749   then
11104 ;          5750       begin                                !ERROR IF YES
11105 ;          5751       ERRDF (28, ASYNC, DUMPER);
11106 ;          5752       PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_5, WRD_19);
11107 ;          5753       end;
11108 ;          5754
11109 ;          5755   DELAY (FRTY_US);                         !WAIT FOR XFERR TO COMPLETE
11110 ;          5756
11111 ;          5757   if .DRY IS_NOT_SET                       !SEE IF DRY CLEARED AFTER XFERR
11112 ;          5758   then
11113 ;          5759       begin
11114 ;          5760
11115 ;          5761       if .GO IS_SET                        !TST GO CLR IF DRY NOT SET
11116 ;          5762       then
11117 ;          5763           begin
11118 ;          5764           CLR_MBUS;                        !CLEAR GO IF STILL SET
11119 ;          5765
11120 ;          5766           if .GO IS_SET then ERRDF (29, ASYNC, DUMPER) else ERRDF (30, SYNC, DUMPER);
11121 ;          5767
11122 ;          5768                                            !TST GO TO DETERMINE FAILING MOD
11123 ;          5769           PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
11124 ;          5770           end
11125 ;          5771       else                                 !DRY NOT SET AND GO CLEARED
11126 ;          5772           begin                            !REPORT ERROR
11127 ;          5773           ERRDF (31, ASYNC, DUMPER);
11128 ;          5774           PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_5, WRD_19);
11129 ;          5775           end;
11130 ;          5776
11131 ;          5777       DODU_FLG = ONE;                      !SET DODU_FLG
11132 ;          5778       end;
11133 ;          5779
11134 ;          5780   if .GO IS_SET                            !SEE IF GO CLEARED AFTER XFERR.
11135 ;          5781   then
11136 ;          5782       begin
11137 ;          5783       CLR_MBUS;                            !CLEAR GO IF STILL SET
11138 ;          5784
11139 ;          5785       if .GO IS_SET then ERRDF (32, ASYNC, DUMPER) else ERRDF (33, SYNC, DUMPER);
11140 ;          5786
11141 ;          5787                                            !TST GO TO DETERMINE FAILING MOD
11142 ;          5788       PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
11143 ;          5789       DODU_FLG = ONE;
11144 ;          5790       end;
11145 ;          5791
11146 ;          5792   ENDSUB;
11147 ;          5793
11148 ;          5794   if .TRE IS_SET                           !SEE IF XFERR CAUSED A TRANSFER ERROR
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)

;          5795  then
;          5796      begin                                      !REPORT ERROR IF SET AND CONTINUE TESTING
;          5797      ERRDF (115, INTER, DUMPER);
;          5798      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_5, WRD_19);
;          5799      end;
;          5800
;          5801  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG SET
;          5802  then
;          5803      begin
;          5804      DODU (.ML_LUN);
;          5805      DOCLN;
;          5806      end;
;          5807
;          5808  ENDTST;

                                        .SBTTL  $T14 TEST CODE SECTION
040244  004167  144270          $T14:   JSR     R1,$SAVE2                   ;                                  5689
040250  005746                          TST     -(SP)
040252  104402                  1$:     TRAP    2                           ;                                  5708
040254  152777  000040  155162          BISB    #40,@ML.REG+40              ;                                  5710
040262  016701  155544                  MOV     ML.DUT,R1
040266  042701  177770                  BIC     #177770,R1
040272  142777  000007  155144          BICB    #7,@ML.REG+40
040300  150177  155140                  BISB    R1,@ML.REG+40
040304  005002                          CLR     R2                          ; DODU.FLG                         5712
040306  004767  157750                  JSR     PC,FIRST.BLK.XFER           ;                                  5713
040312  012777  000061  155064          MOV     #61,@ML.REG                 ;                                  5714
040320  132777  000001  155056          BITB    #1,@ML.REG                  ;                                  5716
040326  001057                          BNE     2$
040330  104455                          TRAP    55                          ;                                  5719
040332  000030                          .WORD   30
040334  012706                          .WORD   ASYNC
040336  026302                          .WORD   DUMPER
040340  012746  010730                  MOV     #WRD.19,-(SP)               ;                                  5720
040344  012746  012216                  MOV     #FNC.5,-(SP)
040350  012746  010650                  MOV     #WRD.12,-(SP)
040354  012746  011610                  MOV     #PHR.1,-(SP)
040360  012746  010520                  MOV     #WRD.1,-(SP)
040364  012746  010304                  MOV     #FIV.FMT,-(SP)
040370  012746  000006                  MOV     #6,-(SP)
040374  010600                          MOV     SP,R0                       ; SP,*
040376  104414                          TRAP    14
040400  132777  000200  155046          BITB    #200,@ML.REG+50             ;                                  5722
040406  001056                          BNE     3$
040410  104455                          TRAP    55                          ;                                  5725
040412  000031                          .WORD   31
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

040414  012706                                  .WORD   ASYNC
040416  026302                                  .WORD   DUMPER
040420  012746  011726                          MOV     #PHR.6,-(SP)                    ;                                5726
040424  012746  010520                          MOV     #WRD.1,-(SP)
040430  012746  011176                          MOV     #WRD.43,-(SP)
040434  012746  011610                          MOV     #PHR.1,-(SP)
040440  012746  010524                          MOV     #WRD.2,-(SP)
040444  012746  010304                          MOV     #FIV.FMT,-(SP)
040450  012746  000006                          MOV     #6,-(SP)
040454  010600                                  MOV     SP,R0                           ; SP,*
040456  104414                                  TRAP    14
040460  062706  000016                          ADD     #16,SP                          ;                                5724
040464  000427                                  BR      3$                              ;                                5729
040466  105777  154762                  2$:     TSTB    @ML.REG+50                      ;                                5733
040472  100030                                  BPL     4$
040474  104455                                  TRAP    55                              ;                                5736
040476  000032                                  .WORD   32
040500  012706                                  .WORD   ASYNC
040502  026302                                  .WORD   DUMPER
040504  012746  011714                          MOV     #PHR.5,-(SP)                    ;                                5737
040510  012746  010520                          MOV     #WRD.1,-(SP)
040514  012746  011176                          MOV     #WRD.43,-(SP)
040520  012746  011626                          MOV     #PHR.2,-(SP)
040524  012746  010524                          MOV     #WRD.2,-(SP)
040530  012746  010304                          MOV     #FIV.FMT,-(SP)
040534  012746  000006                          MOV     #6,-(SP)
040540  010600                                  MOV     SP,R0                           ; SP,*
040542  104414                                  TRAP    14
040544  012702  000001                  3$:     MOV     #1,R2                           ; *,DODU.FLG                     5738
040550  062706  000016                          ADD     #16,SP                          ;                                5735
040554  132777  000001  154702          4$:     BITB    #1,@ML.REG+60                   ;                                5741
040562  001426                                  BEQ     5$
040564  104455                                  TRAP    55                              ;                                5744
040566  000033                                  .WORD   33
040570  012706                                  .WORD   ASYNC
040572  026302                                  .WORD   DUMPER
040574  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5745
040600  012746  012216                          MOV     #FNC.5,-(SP)
040604  012746  010650                          MOV     #WRD.12,-(SP)
040610  012746  011714                          MOV     #PHR.5,-(SP)
040614  012746  010536                          MOV     #WRD.3,-(SP)
040620  012746  010304                          MOV     #FIV.FMT,-(SP)
040624  012746  000006                          MOV     #6,-(SP)
040630  010600                                  MOV     SP,R0                           ; SP,*
040632  104414                                  TRAP    14
040634  062706  000016                          ADD     #16,SP                          ;                                5743
040640  032777  020000  154616          5$:     BIT     #20000,@ML.REG+60               ;                                5748
040646  001426                                  BEQ     6$
040650  104455                                  TRAP    55                              ;                                5751
040652  000034                                  .WORD   34
040654  012706                                  .WORD   ASYNC
040656  026302                                  .WORD   DUMPER
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

040660  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       5752
040664  012746  012216                          MOV     #FNC.5,-(SP)
040670  012746  010650                          MOV     #WRD.12,-(SP)
040674  012746  011714                          MOV     #PHR.5,-(SP)
040700  012746  010544                          MOV     #WRD.4,-(SP)
040704  012746  010304                          MOV     #FIV.FMT,-(SP)
040710  012746  000006                          MOV     #6,-(SP)
040714  010600                                  MOV     SP,R0                           ; SP,*
040716  104414                                  TRAP    14
040720  062706  000016                          ADD     #16,SP                          ;                                       5750
040724  012700  000050                  6$:     MOV     #50,R0                          ; *,$$TMP2                              5755
040730  001410                          7$:     BEQ     10$
040732  016701  141160                          MOV     L$DLY,R1                        ; *,$$TMP1
040736  001403                                  BEQ     9$
040740  005016                          8$:     CLR     (SP)                            ; $$TMP
040742  005301                                  DEC     R1                              ; $$TMP1
040744  001375                                  BNE     8$
040746  005300                          9$:     DEC     R0                              ; $$TMP2
040750  000767                                  BR      7$
040752  132777  000200  154474          10$:    BITB    #200,@ML.REG+50                 ;                                       5757
040760  001106                                  BNE     15$
040762  132777  000001  154414                  BITB    #1,@ML.REG                      ;                                       5761
040770  001452                                  BEQ     13$
040772  152777  000040  154444                  BISB    #40,@ML.REG+40                  ;                                       5763
041000  016701  155026                          MOV     ML.DUT,R1
041004  042701  177770                          BIC     #177770,R1
041010  142777  000007  154426                  BICB    #7,@ML.REG+40
041016  150177  154422                          BISB    R1,@ML.REG+40
041022  132777  000001  154354                  BITB    #1,@ML.REG                      ;                                       5766
041030  001405                                  BEQ     11$
041032  104455                                  TRAP    55
041034  000035                                  .WORD   35
041036  012706                                  .WORD   ASYNC
041040  026302                                  .WORD   DUMPER
041042  000404                                  BR      12$
041044  104455                          11$:    TRAP    55
041046  000036                                  .WORD   36
041050  012750                                  .WORD   SYNC
041052  026302                                  .WORD   DUMPER
041054  012746  010730                  12$:    MOV     #WRD.19,-(SP)                   ;                                       5769
041060  012746  012216                          MOV     #FNC.5,-(SP)
041064  012746  010640                          MOV     #WRD.11,-(SP)
041070  012746  011626                          MOV     #PHR.2,-(SP)
041074  012746  010520                          MOV     #WRD.1,-(SP)
041100  012746  010304                          MOV     #FIV.FMT,-(SP)
041104  012746  000006                          MOV     #6,-(SP)
041110  010600                                  MOV     SP,R0                           ; SP,*
041112  104414                                  TRAP    14
041114  000424                                  BR      14$                             ;                                       5761
041116  104455                          13$:    TRAP    55                              ;                                       5773
041120  000037                                  .WORD   37
041122  012706                                  .WORD   ASYNC
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

041124  026302                                  .WORD   DUMPER
041126  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5774
041132  012746  012216                          MOV     #FNC.5,-(SP)
041136  012746  010640                          MOV     #WRD.11,-(SP)
041142  012746  011610                          MOV     #PHR.1,-(SP)
041146  012746  010524                          MOV     #WRD.2,-(SP)
041152  012746  010304                          MOV     #FIV.FMT,-(SP)
041156  012746  000006                          MOV     #6,-(SP)
041162  010600                                  MOV     SP,R0                           ; SP,*
041164  104414                                  TRAP    14
041166  012702  000001                  14$:    MOV     #1,R2                           ; *,DODU.FLG                     5777
041172  062706  000016                          ADD     #16,SP                          ;                                5759
041176  132777  000001  154200          15$:    BITB    #1,@ML.REG                      ;                                5780
041204  001455                                  BEQ     18$
041206  152777  000040  154230                  BISB    #40,@ML.REG+40                  ;                                5782
041214  016701  154612                          MOV     ML.DUT,R1
041220  042701  177770                          BIC     #177770,R1
041224  142777  000007  154212                  BICB    #7,@ML.REG+40
041232  150177  154206                          BISB    R1,@ML.REG+40
041236  132777  000001  154140                  BITB    #1,@ML.REG                      ;                                5785
041244  001405                                  BEQ     16$
041246  104455                                  TRAP    55
041250  000040                                  .WORD   40
041252  012706                                  .WORD   ASYNC
041254  026302                                  .WORD   DUMPER
041256  000404                                  BR      17$
041260  104455                          16$:    TRAP    55
041262  000041                                  .WORD   41
041264  012750                                  .WORD   SYNC
041266  026302                                  .WORD   DUMPER
041270  012746  010730                  17$:    MOV     #WRD.19,-(SP)                   ;                                5788
041274  012746  012216                          MOV     #FNC.5,-(SP)
041300  012746  010640                          MOV     #WRD.11,-(SP)
041304  012746  011626                          MOV     #PHR.2,-(SP)
041310  012746  010520                          MOV     #WRD.1,-(SP)
041314  012746  010304                          MOV     #FIV.FMT,-(SP)
041320  012746  000006                          MOV     #6,-(SP)
041324  010600                                  MOV     SP,R0                           ; SP,*
041326  104414                                  TRAP    14
041330  012702  000001                          MOV     #1,R2                           ; *,DODU.FLG                     5789
041334  062706  000016                          ADD     #16,SP                          ;                                5782
041340  104467                          18$:    TRAP    67                              ;                                5790
041342  006000                                  ROR     R0
041344  103002                                  BHIS    19$
041346  000167  176700                          JMP     1$
041352  032777  040000  154024          19$:    BIT     #40000,@ML.REG                  ;                                5794
041360  001430                                  BEQ     20$
041362  104455                                  TRAP    55                              ;                                5797
041364  000163                                  .WORD   163
041366  013114                                  .WORD   INTER
041370  026302                                  .WORD   DUMPER
041372  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5798
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA.<

041376  012746  012216                          MOV     #FNC.5,-(SP)
041402  012746  010650                          MOV     #WRD.12,-(SP)
041406  012746  011714                          MOV     #PHR.5,-(SP)
041412  012746  010736                          MOV     #WRD.20,-(SP)
041416  012746  011416                          MOV     #WRD.61,-(SP)
041422  012746  010322                          MOV     #SIX.FMT,-(SP)
041426  012746  000007                          MOV     #7,-(SP)
041432  010600                                  MOV     SP,R0                           ; SP,*
041434  104414                                  TRAP    14
041436  062706  000020                          ADD     #20,SP                          ;                                       5796
041442  005302                          20$:    DEC     R2                              ; DODU.FLG                              5801
041444  001004                                  BNE     21$
041446  016700  154356                          MOV     ML.LUN,R0                       ;                                       5804
041452  104451                                  TRAP    51
041454  104444                                  TRAP    44
041456  005726                          21$:    TST     (SP)+                           ;                                       5689
041460  000207                                  RTS     PC

                                        ; Routine Size:  327 words
                                        ; Maximum stack depth per invocation:  18 words



                                                .SBTTL  T14 TEST CODE SECTION
041462                                  T14::
041462  004767  176556                  1$:     JSR     PC,$T14                         ;                                       5806
041466  104466                                  TRAP    66
041470  006000                                  ROR     R0
041472  103773                                  BLO     1$
041474  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          5809  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)

;       5810  !
;       5811  !
;       5812  BGNTST;
;       5813
;       5814  !++
;       5815  ! TEST NUMBER:  TST 15
;       5816  !
;       5817  ! TEST NAME:    READ FUNCTION TEST
;       5818  !
;       5819  ! TEST DESCRIPTION:
;       5820  !
;       5821  !       TEST IF THE DRIVE CAN PERFORM
;       5822  !       A READ FUNCTION WITHOUT
;       5823  !       HANGING THE DRIVE.
;       5824  !
;       5825  !       A READ FUNCTION IS WRITTEN
;       5826  !       INTO MLCS1
;       5827  !
;       5828  !       THEN GO AND ERROR BITS ARE
;       5829  !       CHECKED FOR CORRECT STATES.
;       5830  !
;       5831  !--
;       5832
;       5833  local
;       5834      DODU_FLG;                                     !DROP UNIT FLAG
;       5835
;       5836  BGNSUB;
;       5837  CLR_MBUS;
;       5838  DODU_FLG = ZERO;
;       5839  FIRST_BLK_XFER ();                                !SET UP A FIRST BLK XFERR
;       5840  MLCS1 = read;                                     !DO A READ FUNCTION
;       5841
;       5842  if .GO IS_NOT_SET                                 !SEE IF GO GOT SET
;       5843  then
;       5844      begin                                         !ERROR IF CLEAR
;       5845      ERRDF (34, ASYNC, DUMPER);
;       5846      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_6, WRD_19);
;       5847
;       5848      if .DRY IS_NOT_SET                            !TST DRY SET WITH GO CLEAR
;       5849      then
;       5850          begin                                     !ERROR IF NOT SET
;       5851          ERRDF (35, ASYNC, DUMPER);
;       5852          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
;       5853          end;
;       5854
;       5855      DODU_FLG = ONE;                               !SET DODU_FLG
;       5856      end
;       5857  else                                              !GO BIT GOT SET
;       5858
;       5859      if .DRY IS_SET                                !SEE IF DRY IS CLEAR
;       5860      then
;       5861          begin                                     !ERROR IF SET
```

```
11484 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
11485 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)
11486 ;
11487 ;          5862          ERRDF (36, ASYNC, DUMPER);
11488 ;          5863          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_6);
11489 ;          5864          DODU_FLG = ONE;
11490 ;          5865          end;
11491 ;          5866
11492 ;          5867  if .ILF IS_SET                            !DID FUNCTION CAUSE ILF
11493 ;          5868  then
11494 ;          5869      begin                                 !ERROR IF YES
11495 ;          5870      ERRDF (37, ASYNC, DUMPER);
11496 ;          5871      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_6, WRD_19);
11497 ;          5872      end;
11498 ;          5873
11499 ;          5874  if .OPI IS_SET                            !DID FUNCTION CAUSE OPI
11500 ;          5875  then
11501 ;          5876      begin                                 !ERROR IF YES
11502 ;          5877      ERRDF (38, ASYNC, DUMPER);
11503 ;          5878      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_6, WRD_19);
11504 ;          5879      end;
11505 ;          5880
11506 ;          5881  DELAY (FRTY_US);                          !WAIT FOR XFERR TO COMPLETE
11507 ;          5882
11508 ;          5883  if .DRY IS_NOT_SET                        !IS DRY SET AFTER XFERR
11509 ;          5884  then
11510 ;          5885      begin
11511 ;          5886
11512 ;          5887      if .GO IS_SET                         !TEST GO CLEAR WITH DRY NOT SET
11513 ;          5888      then
11514 ;          5889          begin
11515 ;          5890          CLR_MBUS;                         !CLEAR GO
11516 ;          5891
11517 ;          5892          if .GO IS_SET then ERRDF (39, ASYNC, DUMPER) else ERRDF (40, SYNC, DUMPER);
11518 ;          5893
11519 ;          5894                                            !TST GO TO DETERMINE FAILING MOD
11520 ;          5895          PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
11521 ;          5896          end
11522 ;          5897      else                                  !GO BIT CLEAR WITH DRY NOT SET
11523 ;          5898          begin                             !REPORT ERROR
11524 ;          5899          ERRDF (41, ASYNC, DUMPER);
11525 ;          5900          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_6, WRD_19);
11526 ;          5901          end;
11527 ;          5902
11528 ;          5903      DODU_FLG = ONE;                       !SET DODU_FLG
11529 ;          5904      end;
11530 ;          5905
11531 ;          5906  if .GO IS_SET                            !SEE IF GO CLEAR AFTER XFERR
11532 ;          5907  then
11533 ;          5908      begin
11534 ;          5909      CLR_MBUS;                             !CLEAR GO IF STILL SET
11535 ;          5910
11536 ;          5911      if .GO IS_SET then ERRDF (42, ASYNC, DUMPER) else ERRDF (43, SYNC, DUMPER);
11537 ;          5912
11538 ;          5913                                            !TST GO TO DETERMINE FAILING MOD
```

```
11540 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
11541 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)
11542 ;
11543 ;          5914      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
11544 ;          5915      DODU_FLG = ONE;
11545 ;          5916      end;
11546 ;          5917
11547 ;          5918  ENDSUB;
11548 ;          5919
11549 ;          5920  if .TRE IS_SET                            !SEE IF XFERR CAUSED A TRANSFER ERROR
11550 ;          5921  then
11551 ;          5922      begin                                 !REPORT ERROR IF SET AND CONTINUE TESTING
11552 ;          5923      ERRDF (116, INTER, DUMPER);
11553 ;          5924      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_6, WRD_19);
11554 ;          5925      end;
11555 ;          5926
11556 ;          5927  if .DODU_FLG IS_SET                       !DROP THIS UNIT IF DODU_FLG SET
11557 ;          5928  then
11558 ;          5929      begin
11559 ;          5930      DODU (.ML_LUN);
11560 ;          5931      DOCLN;
11561 ;          5932      end;
11562 ;          5933
11563 ;          5934  ENDTST;
11567
11568                                          .SBTTL  $T15 TEST CODE SECTION
11572 041476  004167  143036          $T15:   JSR     R1,$SAVE2                 ;                          5808
11573 041502  005746                          TST     -(SP)
11574 041504  104402                  1$:     TRAP    2                         ;                          5834
11575 041506  152777  000040  153730          BISB    #40,@ML.REG+40            ;                          5836
11576 041514  016701  154312                  MOV     ML.DUT,R1
11577 041520  042701  177770                  BIC     #177770,R1
11578 041524  142777  000007  153712          BICB    #7,@ML.REG+40
11579 041532  150177  153706                  BISB    R1,@ML.REG+40
11580 041536  005002                          CLR     R2                        ; DODU.FLG                 5838
11581 041540  004767  156516                  JSR     PC,FIRST.BLK.XFER         ;                          5839
11582 041544  012777  000071  153632          MOV     #71,@ML.REG               ;                          5840
11583 041552  132777  000001  153624          BITB    #1,@ML.REG                ;                          5842
11584 041560  001057                          BNE     2$
11585 041562  104455                          TRAP    55                        ;                          5845
11586 041564  000042                          .WORD   42
11587 041566  012706                          .WORD   ASYNC
11588 041570  026302                          .WORD   DUMPER
11589 041572  012746  010730                  MOV     #WRD.19,-(SP)             ;                          5846
11590 041576  012746  012226                  MOV     #FNC.6,-(SP)
11591 041602  012746  010650                  MOV     #WRD.12,-(SP)
11592 041606  012746  011610                  MOV     #PHR.1,-(SP)
11593 041612  012746  010520                  MOV     #WRD.1,-(SP)
11594 041616  012746  010304                  MOV     #FIV.FMT,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

041622  012746  000006                          MOV     #6,-(SP)
041626  010600                                  MOV     SP,R0                   ; SP,*
041630  104414                                  TRAP    14
041632  132777  000200  153614                  BITB    #200,@ML.REG+50         ;                                       5848
041640  001056                                  BNE     3$
041642  104455                                  TRAP    55                      ;                                       5851
041644  000043                                  .WORD   43
041646  012706                                  .WORD   ASYNC
041650  026302                                  .WORD   DUMPER
041652  012746  011726                          MOV     #PHR.6,-(SP)            ;                                       5852
041656  012746  010520                          MOV     #WRD.1,-(SP)
041662  012746  011176                          MOV     #WRD.43,-(SP)
041666  012746  011610                          MOV     #PHR.1,-(SP)
041672  012746  010524                          MOV     #WRD.2,-(SP)
041676  012746  010304                          MOV     #FIV.FMT,-(SP)
041702  012746  000006                          MOV     #6,-(SP)
041706  010600                                  MOV     SP,R0                   ; SP,*
041710  104414                                  TRAP    14
041712  062706  000016                          ADD     #16,SP                  ;                                       5850
041716  000427                                  BR      3$                      ;                                       5855
041720  105777  153530                  2$:     TSTB    @ML.REG+50              ;                                       5859
041724  100030                                  BPL     4$
041726  104455                                  TRAP    55                      ;                                       5862
041730  000044                                  .WORD   44
041732  012706                                  .WORD   ASYNC
041734  026302                                  .WORD   DUMPER
041736  012746  011726                          MOV     #PHR.6,-(SP)            ;                                       5863
041742  012746  010520                          MOV     #WRD.1,-(SP)
041746  012746  011176                          MOV     #WRD.43,-(SP)
041752  012746  011626                          MOV     #PHR.2,-(SP)
041756  012746  010524                          MOV     #WRD.2,-(SP)
041762  012746  010304                          MOV     #FIV.FMT,-(SP)
041766  012746  000006                          MOV     #6,-(SP)
041772  010600                                  MOV     SP,R0                   ; SP,*
041774  104414                                  TRAP    14
041776  012702  000001                  3$:     MOV     #1,R2                   ; *,DODU.FLG                            5864
042002  062706  000016                          ADD     #16,SP                  ;                                       5861
042006  132777  000001  153450          4$:     BITB    #1,@ML.REG+60           ;                                       5867
042014  001426                                  BEQ     5$
042016  104455                                  TRAP    55                      ;                                       5870
042020  000045                                  .WORD   45
042022  012706                                  .WORD   ASYNC
042024  026302                                  .WORD   DUMPER
042026  012746  010730                          MOV     #WRD.19,-(SP)           ;                                       5871
042032  012746  012226                          MOV     #FNC.6,-(SP)
042036  012746  010650                          MOV     #WRD.12,-(SP)
042042  012746  011714                          MOV     #PHR.5,-(SP)
042046  012746  010536                          MOV     #WRD.3,-(SP)
042052  012746  010304                          MOV     #FIV.FMT,-(SP)
042056  012746  000006                          MOV     #6,-(SP)
042062  010600                                  MOV     SP,R0                   ; SP,*
042064  104414                                  TRAP    14
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

042066  062706  000016                          ADD     #16,SP                  ;                                       5869
042072  032777  020000  153364  5$:             BIT     #20000,@ML.REG+60       ;                                       5874
042100  001426                                  BEQ     6$
042102  104455                                  TRAP    55                      ;                                       5877
042104  000046                                  .WORD   46
042106  012706                                  .WORD   ASYNC
042110  026302                                  .WORD   DUMPER
042112  012746  010730                          MOV     #WRD.19,-(SP)           ;                                       5878
042116  012746  012226                          MOV     #FNC.6,-(SP)
042122  012746  010650                          MOV     #WRD.12,-(SP)
042126  012746  011714                          MOV     #PHR.5,-(SP)
042132  012746  010544                          MOV     #WRD.4,-(SP)
042136  012746  010304                          MOV     #FIV.FMT,-(SP)
042142  012746  000006                          MOV     #6,-(SP)
042146  010600                                  MOV     SP,R0                   ; SP,*
042150  104414                                  TRAP    14
042152  062706  000016                          ADD     #16,SP                  ;                                       5876
042156  012700  000050          6$:             MOV     #50,R0                  ; *,$$TMP2                              5881
042162  001410                  7$:             BEQ     10$
042164  016701  137726                          MOV     L$DLY,R1                ; *,$$TMP1
042170  001403                                  BEQ     9$
042172  005016                  8$:             CLR     (SP)                    ; $$TMP
042174  005301                                  DEC     R1                      ; $$TMP1
042176  001375                                  BNE     8$
042200  005300                  9$:             DEC     R0                      ; $$TMP2
042202  000767                                  BR      7$
042204  132777  000200  153242  10$:            BITB    #200,@ML.REG+50         ;                                       5883
042212  001106                                  BNE     15$
042214  132777  000001  153162                  BITB    #1,@ML.REG              ;                                       5887
042222  001452                                  BEQ     13$
042224  152777  000040  153212                  BISB    #40,@ML.REG+40          ;                                       5889
042232  016701  153574                          MOV     ML.DUT,R1
042236  042701  177770                          BIC     #177770,R1
042242  142777  000007  153174                  BICB    #7,@ML.REG+40
042250  150177  153170                          BISB    R1,@ML.REG+40
042254  132777  000001  153122                  BITB    #1,@ML.REG              ;                                       5892
042262  001405                                  BEQ     11$
042264  104455                                  TRAP    55
042266  000047                                  .WORD   47
042270  012706                                  .WORD   ASYNC
042272  026302                                  .WORD   DUMPER
042274  000404                                  BR      12$
042276  104455                  11$:            TRAP    55
042300  000050                                  .WORD   50
042302  012750                                  .WORD   SYNC
042304  026302                                  .WORD   DUMPER
042306  012746  010730          12$:            MOV     #WRD.19,-(SP)           ;                                       5895
042312  012746  012226                          MOV     #FNC.6,-(SP)
042316  012746  010640                          MOV     #WRD.11,-(SP)
042322  012746  011626                          MOV     #PHR.2,-(SP)
042326  012746  010520                          MOV     #WRD.1,-(SP)
042332  012746  010304                          MOV     #FIV.FMT,-(SP)
```

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11708                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
11709                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
11710
11711 042336  012746  000006                    MOV     #6,-(SP)
11712 042342  010600                            MOV     SP,R0           ; SP,*
11713 042344  104414                            TRAP    14
11714 042346  000424                            BR      14$             ;                               5887
11715 042350  104455                    13$:    TRAP    55              ;                               5899
11716 042352  000051                            .WORD   51
11717 042354  012706                            .WORD   ASYNC
11718 042356  026302                            .WORD   DUMPER
11719 042360  012746  010730                    MOV     #WRD.19,-(SP)   ;                               5900
11720 042364  012746  012226                    MOV     #FNC.6,-(SP)
11721 042370  012746  010640                    MOV     #WRD.11,-(SP)
11722 042374  012746  011610                    MOV     #PHR.1,-(SP)
11723 042400  012746  010524                    MOV     #WRD.2,-(SP)
11724 042404  012746  010304                    MOV     #FIV.FMT,-(SP)
11725 042410  012746  000006                    MOV     #6,-(SP)
11726 042414  010600                            MOV     SP,R0           ; SP,*
11727 042416  104414                            TRAP    14
11728 042420  012702  000001            14$:    MOV     #1,R2           ; *,DODU.FLG                    5903
11729 042424  062706  000016                    ADD     #16,SP          ;                               5885
11730 042430  132777  000001  152746    15$:    BITB    #1,@ML.REG      ;                               5906
11731 042436  001455                            BEQ     18$
11732 042440  152777  000040  152776            BISB    #40,@ML.REG+40  ;                               5908
11733 042446  016701  153360                    MOV     ML.DUT,R1
11734 042452  042701  177770                    BIC     #177770,R1
11735 042456  142777  000007  152760            BICB    #7,@ML.REG+40
11736 042464  150177  152754                    BISB    R1,@ML.REG+40
11737 042470  132777  000001  152706            BITB    #1,@ML.REG      ;                               5911
11738 042476  001405                            BEQ     16$
11739 042500  104455                            TRAP    55
11740 042502  000052                            .WORD   52
11741 042504  012706                            .WORD   ASYNC
11742 042506  026302                            .WORD   DUMPER
11743 042510  000404                            BR      17$
11744 042512  104455                    16$:    TRAP    55
11745 042514  000053                            .WORD   53
11746 042516  012750                            .WORD   SYNC
11747 042520  026302                            .WORD   DUMPER
11748 042522  012746  010730            17$:    MOV     #WRD.19,-(SP)   ;                               5914
11749 042526  012746  012226                    MOV     #FNC.6,-(SP)
11750 042532  012746  010640                    MOV     #WRD.11,-(SP)
11751 042536  012746  011626                    MOV     #PHR.2,-(SP)
11752 042542  012746  010520                    MOV     #WRD.1,-(SP)
11753 042546  012746  010304                    MOV     #FIV.FMT,-(SP)
11754 042552  012746  000006                    MOV     #6,-(SP)
11755 042556  010600                            MOV     SP,R0           ; SP,*
11756 042560  104414                            TRAP    14
11757 042562  012702  000001                    MOV     #1,R2           ; *,DODU.FLG                    5915
11758 042566  062706  000016                    ADD     #16,SP          ;                               5908
11759 042572  104467                    18$:    TRAP    67              ;                               5916
11760 042574  006000                            ROR     R0
11761 042576  103002                            BHIS    19$
11762 042600  000167  176700                    JMP     1$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

042604  032777  040000  152572  19$:    BIT     #40000,@ML.REG                  ;                                       5920
042612  001430                          BEQ     20$
042614  104455                          TRAP    55                              ;                                       5923
042616  000164                          .WORD   164
042620  013114                          .WORD   INTER
042622  026302                          .WORD   DUMPER
042624  012746  010730                  MOV     #WRD.19,-(SP)                   ;                                       5924
042630  012746  012226                  MOV     #FNC.6,-(SP)
042634  012746  010650                  MOV     #WRD.12,-(SP)
042640  012746  011714                  MOV     #PHR.5,-(SP)
042644  012746  010736                  MOV     #WRD.20,-(SP)
042650  012746  011416                  MOV     #WRD.61,-(SP)
042654  012746  010322                  MOV     #SIX.FMT,-(SP)
042660  012746  000007                  MOV     #7,-(SP)
042664  010600                          MOV     SP,R0                           ; SP,*
042666  104414                          TRAP    14
042670  062706  000020                  ADD     #20,SP                          ;                                       5922
042674  005302                  20$:    DEC     R2                              ; DODU.FLG                              5927
042676  001004                          BNE     21$
042700  016700  153124                  MOV     ML.LUN,R0                       ;                                       5930
042704  104451                          TRAP    51
042706  104444                          TRAP    44
042710  005726                  21$:    TST     (SP)+                           ;                                       5808
042712  000207                          RTS     PC

                                        ; Routine Size:  327 words
                                        ; Maximum stack depth per invocation:  18 words



                                                .SBTTL  T15 TEST CODE SECTION
042714                          T15::
042714  004767  176556          1$:     JSR     PC,$T15                         ;                                       5932
042720  104466                          TRAP    66
042722  006000                          ROR     R0
042724  103773                          BLO     1$
042726  000207                          RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
11825
11826
11827 ;          5935  !<BLF/PAGE>
```

```
11829 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
11830 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (68)
11831 ;
11832 ;          5936  !
11833 ;          5937  BGNTS ;
11834 ;          5938
11835 ;          5939  !++
11836 ;          5940  ! TEST NUMBER:  TST 16
11837 ;          5941  !
11838 ;          5942  ! TEST NAME:    CLEAR FUNCTION TEST
11839 ;          5943  !
11840 ;          5944  ! TEST DESCRIPTION:
11841 ;          5945  !       TEST IF THE DRIVE CAN PERFORM A CLEAR FUNCTION WITHOUT HANGING THE DRIVE.
11842 ;          5946  !
11843 ;          5947  !       A CLEAR FUNCTION IS WRITTEN INTO MLCS1.
11844 ;          5948  !
11845 ;          5949  !       THEN GO AND ERROR BITS ARE CHECKED FOR CORRECT STATUS.
11846 ;          5950  !       THIS DRIVE IS DROPPED ON DETECTED ERRORS.
11847 ;          5951  !
11848 ;          5952  !--
11849 ;          5953
11850 ;          5954  BGNSUB;
11851 ;          5955  CLR_MBUS;
11852 ;          5956  MLER = ONES;                                  !SET BITS IN ERROR REGISTER
11853 ;          5957  MLCS1 = DRV_CLR;                              !DO A CLEAR FUNCTION
11854 ;          5958  DELAY (ONE_US);                               !DELAY
11855 ;          5959
11856 ;          5960  if .GO IS_SET                                 !SEE IF GO CLEARED AFTER FUNCTION
11857 ;          5961  then
11858 ;          5962      begin                                     !ERROR IF SET
11859 ;          5963      ERRDF (44, ASYNC, DUMPER);
11860 ;          5964      PRINTB (FIV_FMT, WRD_1, PHR_5, WRD_11, FNC_3, FNC_7, WRD_19);
11861 ;          5965
11862 ;          5966      if .DRY IS_SET                            !TST DRY CLEAR WITH GO SET
11863 ;          5967      then
11864 ;          5968          begin                                 !ERROR IF SET
11865 ;          5969          ERRDF (45, ASYNC, DUMPER);
11866 ;          5970          PRINTB (FIV_FMT, WRD_2, PHR_5, WRD_43, WRD_1, PHR_5);
11867 ;          5971          end;
11868 ;          5972
11869 ;          5973      end
11870 ;          5974  else                                          !GO CLEARED AFTER FUNCTION
11871 ;          5975
11872 ;          5976      if .DRY IS_NOT_SET                        !TST DRY SET WITH GO CLEAR
11873 ;          5977      then
11874 ;          5978          begin                                 !ERROR IF NOT SET
11875 ;          5979          ERRDF (46, ASYNC, DUMPER);
11876 ;          5980          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
11877 ;          5981          end;
11878 ;          5982
11879 ;          5983  if .ILF IS_SET                                !DID FUNCTION CAUSE ILF
11880 ;          5984  then
11881 ;          5985      begin                                     !ERROR IF YES
11882 ;          5986      ERRDF (47, ASYNC, DUMPER);
11883 ;          5987      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                        TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (68)

                5988        end;
                5989
                5990    if .OPI IS_SET                  !DID FUNCTION CAUSE OPI
                5991    then
                5992        begin                       !ERROR IF YES
                5993        ERRDF (48, ASYNC, DUMPER);
                5994        PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
                5995        end;
                5996
                5997    if .MLER neq ZERO               !TEST ERROR REGISTER FOR CLEAR
                5998    then
                5999        begin                       !ERROR IF NOT CLEAR
                6000        ERRDF (49, ASYNC, DUMPER);
                6001        PRINTB (SIX_FMT, FNC_3, FNC_7, WRD_19, WRD_14, WRD_13, REG_3);
                6002        end;
                6003
                6004    ENDSUB;
                6005    ENDTST;

                                        .SBTTL  $T16 TEST CODE SECTION
042730 010146           $T16:   MOV     R1,-(SP)            ;                       5934
042732 005746                   TST     -(SP)
042734 104402           1$:     TRAP    2                   ;                       5937
042736 152777 000040 152500     BISB    #40,@ML.REG+40      ;                       5954
042744 016701 153062            MOV     ML.DUT,R1
042750 042701 177770            BIC     #177770,R1
042754 142777 000007 152462     BICB    #7,@ML.REG+40
042762 150177 152456            BISB    R1,@ML.REG+40
042766 012777 177777 152470     MOV     #-1,@ML.REG+60      ;                       5956
042774 012777 000011 152402     MOV     #11,@ML.REG         ;                       5957
043002 012700 000001            MOV     #1,R0               ; *,$$TMP2              5958
043006 001410           2$:     BEQ     5$
043010 016701 137102            MOV     L$DLY,R1            ; *,$$TMP1
043014 001403                   BEQ     4$
043016 005016           3$:     CLR     (SP)                ; $$TMP
043020 005301                   DEC     R1                  ; $$TMP1
043022 001375                   BNE     3$
043024 005300           4$:     DEC     R0                  ; $$TMP2
043026 000767                   BR      2$
043030 132777 000001 152346 5$: BITB    #1,@ML.REG          ;                       5960
043036 001462                   BEQ     7$
043040 104455                   TRAP    55                  ;                       5963
043042 000054                   .WORD   54
043044 012706                   .WORD   ASYNC
043046 026302                   .WORD   DUMPER
043050 012746 010730            MOV     #WRD.19,-(SP)       ;                       5964
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

043054  012746  012234                          MOV     #FNC.7,-(SP)
043060  012746  012172                          MOV     #FNC.3,-(SP)
043064  012746  010640                          MOV     #WRD.11,-(SP)
043070  012746  011714                          MOV     #PHR.5,-(SP)
043074  012746  010520                          MOV     #WRD.1,-(SP)
043100  012746  010304                          MOV     #FIV.FMT,-(SP)
043104  012746  000007                          MOV     #7,-(SP)
043110  010600                                  MOV     SP,R0                   ; SP,*
043112  104414                                  TRAP    14
043114  105777  152334                          TSTB    @ML.REG+50              ;                                       5966
043120  100026                                  BPL     6$
043122  104455                                  TRAP    55                      ;                                       5969
043124  000055                                  .WORD   55
043126  012706                                  .WORD   ASYNC
043130  026302                                  .WORD   DUMPER
043132  012746  011714                          MOV     #PHR.5,-(SP)            ;                                       5970
043136  012746  010520                          MOV     #WRD.1,-(SP)
043142  012746  011176                          MOV     #WRD.43,-(SP)
043146  012746  011714                          MOV     #PHR.5,-(SP)
043152  012746  010524                          MOV     #WRD.2,-(SP)
043156  012746  010304                          MOV     #FIV.FMT,-(SP)
043162  012746  000006                          MOV     #6,-(SP)
043166  010600                                  MOV     SP,R0                   ; SP,*
043170  104414                                  TRAP    14
043172  062706  000016                          ADD     #16,SP                  ;                                       5968
043176  062706  000020                  6$:     ADD     #20,SP                  ;                                       5962
043202  000432                                  BR      8$                      ;                                       5960
043204  132777  000200  152242          7$:     BITB    #200,@ML.REG+50         ;                                       5976
043212  001026                                  BNE     8$
043214  104455                                  TRAP    55                      ;                                       5979
043216  000056                                  .WORD   56
043220  012706                                  .WORD   ASYNC
043222  026302                                  .WORD   DUMPER
043224  012746  011726                          MOV     #PHR.6,-(SP)            ;                                       5980
043230  012746  010520                          MOV     #WRD.1,-(SP)
043234  012746  011176                          MOV     #WRD.43,-(SP)
043240  012746  011610                          MOV     #PHR.1,-(SP)
043244  012746  010524                          MOV     #WRD.2,-(SP)
043250  012746  010304                          MOV     #FIV.FMT,-(SP)
043254  012746  000006                          MOV     #6,-(SP)
043260  010600                                  MOV     SP,R0                   ; SP,*
043262  104414                                  TRAP    14
043264  062706  000016                          ADD     #16,SP                  ;                                       5978
043270  132777  000001  152166          8$:     BITB    #1,@ML.REG+60           ;                                       5983
043276  001430                                  BEQ     9$
043300  104455                                  TRAP    55                      ;                                       5986
043302  000057                                  .WORD   57
043304  012706                                  .WORD   ASYNC
043306  026302                                  .WORD   DUMPER
043310  012746  010730                          MOV     #WRD.19,-(SP)           ;                                       5987
043314  012746  012234                          MOV     #FNC.7,-(SP)
043320  012746  012172                          MOV     #FNC.3,-(SP)
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

043324  012746  010650                          MOV     #WRD.12,-(SP)
043330  012746  011714                          MOV     #PHR.5,-(SP)
043334  012746  010536                          MOV     #WRD.3,-(SP)
043340  012746  010304                          MOV     #FIV.FMT,-(SP)
043344  012746  000007                          MOV     #7,-(SP)
043350  010600                                  MOV     SP,R0                           ; SP,*
043352  104414                                  TRAP    14
043354  062706  000020                          ADD     #20,SP                          ;                                5985
043360  032777  020000  152076  9$:             BIT     #20000,@ML.REG+60               ;                                5990
043366  001430                                  BEQ     10$
043370  104455                                  TRAP    55                              ;                                5993
043372  000060                                  .WORD   60
043374  012706                                  .WORD   ASYNC
043376  026302                                  .WORD   DUMPER
043400  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                5994
043404  012746  012234                          MOV     #FNC.7,-(SP)
043410  012746  012172                          MOV     #FNC.3,-(SP)
043414  012746  010650                          MOV     #WRD.12,-(SP)
043420  012746  011714                          MOV     #PHR.5,-(SP)
043424  012746  010544                          MOV     #WRD.4,-(SP)
043430  012746  010304                          MOV     #FIV.FMT,-(SP)
043434  012746  000007                          MOV     #7,-(SP)
043440  010600                                  MOV     SP,R0                           ; SP,*
043442  104414                                  TRAP    14
043444  062706  000020                          ADD     #20,SP                          ;                                5992
043450  005777  152010          10$:            TST     @ML.REG+60                      ;                                5997
043454  001430                                  BEQ     11$
043456  104455                                  TRAP    55                              ;                                6000
043460  000061                                  .WORD   61
043462  012706                                  .WORD   ASYNC
043464  026302                                  .WORD   DUMPER
043466  012746  012516                          MOV     #REG.3,-(SP)                    ;                                6001
043472  012746  010660                          MOV     #WRD.13,-(SP)
043476  012746  010664                          MOV     #WRD.14,-(SP)
043502  012746  010730                          MOV     #WRD.19,-(SP)
043506  012746  012234                          MOV     #FNC.7,-(SP)
043512  012746  012172                          MOV     #FNC.3,-(SP)
043516  012746  010322                          MOV     #SIX.FMT,-(SP)
043522  012746  000007                          MOV     #7,-(SP)
043526  010600                                  MOV     SP,R0                           ; SP,*
043530  104414                                  TRAP    14
043532  062706  000020                          ADD     #20,SP                          ;                                5999
043536  104467                  11$:            TRAP    67                              ;                                6002
043540  006000                                  ROR     R0
043542  103002                                  BHIS    12$
043544  000167  177164                          JMP     1$
043550  005726                  12$:            TST     (SP)+                           ;                                5934
043552  012601                                  MOV     (SP)+,R1
043554  000207                                  RTS     PC

                                        ; Routine Size:  203 words
                                        ; Maximum stack depth per invocation:  17 words
```

```
                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
                                .SBTTL  T16 TEST CODE SECTION
                                T16::
                                1$:     JSR     PC,$T16                 ;                               6004
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words

                        6006    !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (69)

;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 17
;               !
;               ! TEST NAME: DIAGNOSTIC REGISTER TESTS
;               !
;               ! TEST DESCRIPTION:
;               !       TEST THE DATA DIAG REGISTERS MLD1, MLD2, MLE2
;               !       FOR 1'S/0'S, SHIFTING 1'S/0'S AND INITIALIZATION
;               !
;               !--
;
;               local
;                   CLR_DATA,                                   !CLEAR DATA FOR INIT TEST
;                   SAVE,                                       !TEMPORARY SAVE LOCATION
;                   ERR_FLG,                                    !ERROR FLAG
;                   TST_PAT,                                    !TEST PATTERN
;                   index,                                      !POINTS TO REGISTER PRESENTLY BEING TESTED
;                   DODU_FLG;                                   !DROP UNIT FLAG
;
;               DODU_FLG = ZERO;
;               !
;               !
;               !       FIRST TEST THE REGISTERS FOR ONES AND ZEROES
;               !
;               !
;               TST_PAT = ONES;                                 !LOAD TEST PAT WITH ONES
;               CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;
;               incr TWICE from 0 to 1 do                       !REPEAT LOOP TWICE
;                   begin
;
;                   incr REG_SEL from 11 to 13 do               !TEST ELEVEN WRITE/READ REGISTERS
;                       begin
;                       BGNSUB;
;                       CLR_MBUS;
;                       WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE TO THE REGISTER
;                       RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);   !READ THE REGISTER
;
;                       if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
;                       then
;                           begin                               !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
;                           CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;                           ERRDF (121, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
;                           PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;                           PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;                           DODU_FLG = ONE;
;                           end;
;
;                       ENDSUB;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (69)

;          6059         end;
;          6060
;          6061     TST_PAT = not .TST_PAT;                    !REPEAT AGAIN WITH COMPLIMENT DATA
;          6062     end;
;          6063
;          6064 !
;          6065 !
;          6066 !       TEST THE REGISTERS FOR SHIFTING ONES AND ZEROES
;          6067 !
;          6068 !
;          6069 TST_PAT = ONE;                                 !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
;          6070
;          6071 incr SHIFT from 0 to 15 do                     !DO SHIFT 16 TIMES
;          6072     begin
;          6073
;          6074     incr TWICE from 0 to 1 do                  !REPEAT LOOP TWICE
;          6075         begin
;          6076
;          6077         incr REG_SEL from 11 to 13 do          !TEST ELEVEN READ/WRITE REGISTERS
;          6078             begin
;          6079             BGNSUB;
;          6080             CLR_MBUS;
;          6081             WRT_REG (.TST_PAT, .REG_SEL, index);       !WRITE TO THE REGISTER
;          6082             RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);      !READ THE REGISTER
;          6083
;          6084             if .ERR_FLG IS_SET                 !SEE IF THE READ FOUND AN ERROR
;          6085             then
;          6086                 begin                          !IF THE ERROR FLAG IS SET THEN ERROR
;          6087                 CMP_THRESHOLD;                 !COMPARE ERROR PRINT THRESHOLD
;          6088                 ERRDF (122, ARR_DAT, DUMPER);  !ARRAY DATA MODULE FAILURE
;          6089                 PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;          6090                 PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;          6091                 DODU_FLG = ONE;
;          6092                 end;
;          6093
;          6094             ENDSUB;
;          6095             end;
;          6096
;          6097         TST_PAT = not .TST_PAT;                !REPEAT WITH A 0 IN A FIELD OF 1'S
;          6098         end;
;          6099
;          6100     TST_PAT = .TST_PAT^ONE;                    !SHIFT THE 1 IN THE FIELD OF 0'S
;          6101     end;
;          6102
;          6103 !
;          6104 !
;          6105 !       NOW TEST THE REGISTERS FOR INITIALIZATION
;          6106 !
;          6107 !
;          6108 REG_INIT_FLG = ONE;
;          6109 TST_PAT = ONES;                                 !BACKGROUND PATTERN
;          6110
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (69)

;          6111  incr TWICE from 0 to 1 do                              !REPEAT LOOP TWICE
;          6112      begin
;          6113
;          6114      incr REG_SEL from 11 to 13 do                      !TEST THIRTEEN REGISTERS
;          6115          begin
;          6116          BGNSUB;
;          6117          CLR_MBUS;
;          6118          WRT_REG (.TST_PAT, .REG_SEL, index);           !WRITE REGISTER WITH BACKGROUND
;          6119          CLR_DATA = (.HI) or (.IGNORE);                 !CALCULATE THE CLEARED DATA PATTERN
;          6120          REG_INIT_FLG = ONE;
;          6121          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);         !READ THE REGISTER FOR THE CLEARED DATA PAT
;          6122
;          6123          if .ERR_FLG IS_SET                             !SEE IF READ FOUND AN ERROR
;          6124          then
;          6125              begin                                      !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
;          6126              CMP_THRESHOLD;                             !COMPARE ERROR PRINT THRESHOLD
;          6127              ERRDF (118, ARR_DAT, DUMPER);              !ARRAY DATA MODULE
;          6128              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
;          6129              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
;          6130              DODU_FLG = ONE;
;          6131              end;
;          6132
;          6133          ENDSUB;
;          6134          end;
;          6135
;          6136      TST_PAT = not .TST_PAT;                            !REPEAT WITH COMPLIMENT BACKGROUND PAT
;          6137      end;
;          6138
;          6139  REG_INIT_FLG = ZERO;                                   !CLEAR THE FLAG
;          6140
;          6141  if .DODU_FLG IS_SET                                    !DROP THIS UNIT IF DODU_FLG SET
;          6142  then
;          6143      begin
;          6144      DODU (.ML_LUN);
;          6145      DOCLN;
;          6146      end;
;          6147
;          6148  ENDTST;

                                        .SBTTL  $T17 TEST CODE SECTION
043572  004167  141014          $T17:   JSR     R1,$SAVE5                       ;                                   6005
043576  024646                          CMP     -(SP),-(SP)
043600  005046                          CLR     -(SP)                           ; DODU.FLG                          6029
043602  012702  177777                  MOV     #-1,R2                          ; *,TST.PAT                         6035
043606  005067  151564                  CLR     P.CNT
043612  005004                          CLR     R4                              ; TWICE                             6038
```

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                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        1$:     MOV     #13,R1          ; *,REG.SEL                             6041
                                        2$:     TRAP    2               ;                                       6042
043622  152777  000040  151614                BISB    #40,@ML.REG+40  ;                                       6043
043630  016705  152176                        MOV     ML.DUT,R5
043634  042705  177770                        BIC     #177770,R5
043640  142777  000007  151576                BICB    #7,@ML.REG+40
043646  150577  151572                        BISB    R5,@ML.REG+40
043652  010246                                MOV     R2,-(SP)        ; TST.PAT,*                             6045
043654  010146                                MOV     R1,-(SP)        ; REG.SEL,*
043656  012746  000012                        MOV     #12,-(SP)
043662  060616                                ADD     SP,(SP)         ; INDEX,*
043664  004767  161434                        JSR     PC,WRT.REG
043670  010216                                MOV     R2,(SP)         ; TST.PAT,*                             6046
043672  010146                                MOV     R1,-(SP)        ; REG.SEL,*
043674  012746  000014                        MOV     #14,-(SP)
043700  060616                                ADD     SP,(SP)         ; ERR.FLG,*
043702  004767  162004                        JSR     PC,RD.REG
043706  026627  000014  000001                CMP     14(SP),#1       ; ERR.FLG,*                             6048
043714  001065                                BNE     4$
043716  005267  151454                        INC     P.CNT           ;                                       6050
043722  026767  151450  151450                CMP     P.CNT,LIMIT
043730  003403                                BLE     3$
043732  062706  000012                        ADD     #12,SP
043736  000461                                BR      5$
043740  104455                        3$:     TRAP    55              ;                                       6052
043742  000171                                .WORD   171
043744  013012                                .WORD   ARR.DAT
043746  026302                                .WORD   DUMPER
043750  012746  011344                        MOV     #WRD.56,-(SP)   ;                                       6053
043754  012746  011310                        MOV     #WRD.52,-(SP)
043760  012746  012226                        MOV     #FNC.6,-(SP)
043764  012746  012216                        MOV     #FNC.5,-(SP)
043770  012746  010650                        MOV     #WRD.12,-(SP)
043774  012746  011676                        MOV     #PHR.4,-(SP)
044000  012746  010322                        MOV     #SIX.FMT,-(SP)
044004  012746  000007                        MOV     #7,-(SP)
044010  010600                                MOV     SP,R0           ; SP,*
044012  104414                                TRAP    14
044014  016716  151332                        MOV     RD.DATA,(SP)    ;                                       6054
044020  016746  151324                        MOV     WT.DATA,-(SP)
044024  016600  000040                        MOV     40(SP),R0       ; INDEX,*
044030  006300                                ASL     R0
044032  006300                                ASL     R0
044034  006300                                ASL     R0
044036  016046  015404                        MOV     ML.REG(R0),-(SP)
044042  012746  007436                        MOV     #FMT.16,-(SP)
044046  012746  000004                        MOV     #4,-(SP)
044052  010600                                MOV     SP,R0           ; SP,*
044054  104414                                TRAP    14
044056  012766  000001  000042                MOV     #1,42(SP)       ; *,DODU.FLG                            6055
044064  062706  000030                        ADD     #30,SP          ;                                       6050
044070  062706  000012                4$:     ADD     #12,SP          ;                                       6042
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                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        TRAP    67                      ;                                       6056
                                        ROR     R0
                                        BLO     2$
                                5$:     INC     R1                      ; REG.SEL                               6041
                        000015          CMP     R1,#15                  ; REG.SEL,*
                                        BLE     2$
                                        COM     R2                      ; TST.PAT                               6061
                                        INC     R4                      ; TWICE                                 6038
                        000001          CMP     R4,#1                   ; TWICE,*
                                        BLE     1$
                        000001          MOV     #1,R2                   ; *,TST.PAT                             6069
                                        CLR     R3                      ; SHIFT                                 6071
                                6$:     CLR     R4                      ; TWICE                                 6074
                        000013  7$:     MOV     #13,R1                  ; *,REG.SEL                             6077
                                8$:     TRAP    2                       ;                                       6078
                000040  151274          BISB    #40,@ML.REG+40          ;                                       6079
                151656                  MOV     ML.DUT,R5
                177770                  BIC     #177770,R5
                000007  151256          BICB    #7,@ML.REG+40
                151252                  BISB    R5,@ML.REG+40
                                        MOV     R2,-(SP)                ; TST.PAT,*                             6081
                                        MOV     R1,-(SP)                ; REG.SEL,*
                000012                  MOV     #12,-(SP)
                                        ADD     SP,(SP)                 ; INDEX,*
                161114                  JSR     PC,WRT.REG
                                        MOV     R2,(SP)                 ; TST.PAT,*                             6082
                                        MOV     R1,-(SP)                ; REG.SEL,*
                000014                  MOV     #14,-(SP)
                                        ADD     SP,(SP)                 ; ERR.FLG,*
                161464                  JSR     PC,RD.REG
        000014  000001                  CMP     14(SP),#1               ; ERR.FLG,*                             6084
                                        BNE     10$
                151134                  INC     P.CNT                   ;                                       6086
        151130  151130                  CMP     P.CNT,LIMIT
                                        BLE     9$
                000012                  ADD     #12,SP
                                        BR      11$
                                9$:     TRAP    55                      ;                                       6088
                                        .WORD   172
                                        .WORD   ARR.DAT
                                        .WORD   DUMPER
                011344                  MOV     #WRD.56,-(SP)           ;                                       6089
                011310                  MOV     #WRD.52,-(SP)
                012226                  MOV     #FNC.6,-(SP)
                012216                  MOV     #FNC.5,-(SP)
                010650                  MOV     #WRD.12,-(SP)
                011676                  MOV     #PHR.4,-(SP)
                010322                  MOV     #SIX.FMT,-(SP)
                000007                  MOV     #7,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                151012                  MOV     RD.DATA,(SP)            ;                                       6090
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

044340  016746  151004                          MOV     WT.DATA,-(SP)
044344  016600  000040                          MOV     40(SP),R0                       ; INDEX,*
044350  006300                                  ASL     R0
044352  006300                                  ASL     R0
044354  006300                                  ASL     R0
044356  016046  015404                          MOV     ML.REG(R0),-(SP)
044362  012746  007436                          MOV     #FMT.16,-(SP)
044366  012746  000004                          MOV     #4,-(SP)
044372  010600                                  MOV     SP,R0                           ; SP,*
044374  104414                                  TRAP    14
044376  012766  000001  000042                  MOV     #1,42(SP)                       ; *,DODU.FLG                    6091
C44404  062706  000030                          ADD     #30,SP                          ;                               6086
044410  062706  000012                  10$:    ADD     #12,SP                          ;                               6078
044414  104467                                  TRAP    67                              ;                               6092
044416  006000                                  ROR     R0
044420  103647                                  BLO     8$
044422  005201                          11$:    INC     R1                              ; REG.SEL                       6077
044424  020127  000015                          CMP     R1,#15                          ; REG.SEL,*
044430  003643                                  BLE     8$
044432  005102                                  COM     R2                              ; TST.PAT                       6097
044434  005204                                  INC     R4                              ; TWICE                         6074
044436  020427  000001                          CMP     R4,#1                           ; TWICE,*
044442  003634                                  BLE     7$
044444  006302                                  ASL     R2                              ; TST.PAT                       6100
044446  005203                                  INC     R3                              ; SHIFT                         6071
044450  020327  000017                          CMP     R3,#17                          ; SHIFT,*
044454  003626                                  BLE     6$
044456  012767  000001  150674                  MOV     #1,REG.INIT.FLG                 ;                               6108
044464  012702  177777                          MOV     #-1,R2                          ; *,TST.PAT                     6109
044470  005004                                  CLR     R4                              ; TWICE                         6111
044472  012703  000013                  12$:    MOV     #13,R3                          ; *,REG.SEL                     6114
044476  104402                          13$:    TRAP    2                               ;                               6115
044500  152777  000040  150736                  BISB    #40,@ML.REG+40                  ;                               6116
044506  016701  151320                          MOV     ML.DUT,R1
044512  042701  177770                          BIC     #177770,R1
044516  142777  000007  150720                  BICB    #7,@ML.REG+40
044524  150177  150714                          BISB    R1,@ML.REG+40
044530  010246                                  MOV     R2,-(SP)                        ; TST.PAT,*                     6118
044532  010346                                  MOV     R3,-(SP)                        ; REG.SEL,*
044534  012746  000012                          MOV     #12,-(SP)
044540  060616                                  ADD     SP,(SP)                         ; INDEX,*
044542  004767  160556                          JSR     PC,WRT.REG
044546  016600  000012                          MOV     12(SP),R0                       ; INDEX,*                       6119
044552  006300                                  ASL     R0
044554  006300                                  ASL     R0
044556  006300                                  ASL     R0
044560  010001                                  MOV     R0,R1
044562  016105  015406                          MOV     ML.REG+2(R1),R5                 ; *,CLR.DATA
044566  056105  015412                          BIS     ML.REG+6(R1),R5                 ; *,CLR.DATA
044572  012767  000001  150560                  MOV     #1,REG.INIT.FLG                 ;                               6120
044600  010516                                  MOV     R5,(SP)                         ; CLR.DATA,*                    6121
044602  010346                                  MOV     R3,-(SP)                        ; REG.SEL,*
```

```
12423                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
12424                                   ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
12425
12426 044604  012746  000014                    MOV     #14,-(SP)
12427 044610  060616                            ADD     SP,(SP)                 ; ERR.FLG,*
12428 044612  004767  161074                    JSR     PC,RD.REG
12429 044616  026627  000014  000001            CMP     14(SP),#1               ; ERR.FLG,*                     6123
12430 044624  001055                            BNE     15$
12431 044626  005267  150544                    INC     P.CNT                   ;                               6125
12432 044632  026767  150540  150540            CMP     P.CNT,LIMIT
12433 044640  003403                            BLE     14$
12434 044642  062706  000012                    ADD     #12,SP
12435 044646  000451                            BR      16$
12436 044650  104455                  14$:      TRAP    55                      ;                               6127
12437 044652  000166                            .WORD   166
12438 044654  013012                            .WORD   ARR.DAT
12439 044656  026302                            .WORD   DUMPER
12440 044660  012746  011344                    MOV     #WRD.56,-(SP)           ;                               6128
12441 044664  012746  012464                    MOV     #FNC.23,-(SP)
12442 044670  012746  011310                    MOV     #WRD.52,-(SP)
12443 044674  012746  010650                    MOV     #WRD.12,-(SP)
12444 044700  012746  011676                    MOV     #PHR.4,-(SP)
12445 044704  012746  010304                    MOV     #FIV.FMT,-(SP)
12446 044710  012746  000006                    MOV     #6,-(SP)
12447 044714  010600                            MOV     SP,R0                   ; SP,*
12448 044716  104414                            TRAP    14
12449 044720  016716  150426                    MOV     RD.DATA,(SP)            ;                               6129
12450 044724  010546                            MOV     R5,-(SP)                ; CLR.DATA,*
12451 044726  016146  015404                    MOV     ML.REG(R1),-(SP)
12452 044732  012746  007436                    MOV     #FMT.16,-(SP)
12453 044736  012746  000004                    MOV     #4,-(SP)
12454 044742  010600                            MOV     SP,R0                   ; SP,*
12455 044744  104414                            TRAP    14
12456 044746  012766  000001  000040            MOV     #1,40(SP)               ; *,DODU.FLG                    6130
12457 044754  062706  000026                    ADD     #26,SP                  ;                               6125
12458 044760  062706  000012          15$:      ADD     #12,SP                  ;                               6115
12459 044764  104467                            TRAP    67                      ;                               6131
12460 044766  006000                            ROR     R0
12461 044770  103642                            BLO     13$
12462 044772  005203                  16$:      INC     R3                      ; REG.SEL                       6114
12463 044774  020327  000015                    CMP     R3,#15                  ; REG.SEL,*
12464 045000  003636                            BLE     13$
12465 045002  005102                            COM     R2                      ; TST.PAT                       6136
12466 045004  005204                            INC     R4                      ; TWICE                         6111
12467 045006  020427  000001                    CMP     R4,#1                   ; TWICE,*
12468 045012  003627                            BLE     12$
12469 045014  005067  150340                    CLR     REG.INIT.FLG            ;                               6139
12470 045020  021627  000001                    CMP     (SP),#1                 ; DODU.FLG,*                    6141
12471 045024  001004                            BNE     17$
12472 045026  016700  150776                    MOV     ML.LUN,R0               ;                               6144
12473 045032  104451                            TRAP    51
12474 045034  104444                            TRAP    44
12475 045036  062706  000006          17$:      ADD     #6,SP                   ;                               6005
12476 045042  000207                            RTS     PC
12477
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

                                        ; Routine Size:  341 words
                                        ; Maximum stack depth per invocation:  26 words



                                                .SBTTL  T17 TEST CODE SECTION
045044                                  T17::
045044  004767  176522                  1$:     JSR     PC,$T17                         ;                                       6146
045050  104466                                  TRAP    66
045052  006000                                  ROR     R0
045054  103773                                  BLO     1$
045056  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          6149  !<BLF/PAGE>
```

```
12515 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
12516 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (70)
12517 ;
12518 ;          6150  !
12519 ;          6151  !
12520 ;          6152  BGNTST;
12521 ;          6153
12522 ;          6154  !++
12523 ;          6155  ! TEST NUMBER:  TST 18
12524 ;          6156  !
12525 ;          6157  ! TEST NAME:    COMPOSIT ERROR TEST
12526 ;          6158  !
12527 ;          6159  ! TEST DESCRIPTION:
12528 ;          6160  !       TEST TO SEE IF SETTING EACH
12529 ;          6161  !       BIT IN THE ERROR REGISTER
12530 ;          6162  !       CAUSES A COMPOSIT ERROR BY:
12531 ;          6163  !
12532 ;          6164  !       WRITING A SHIFTING ONE THROUGH
12533 ;          6165  !       THE ERROR REGISTER (SKIPPING THE
12534 ;          6166  !       READ ONLY BITS) AND TESTING THE
12535 ;          6167  !       COMPOSIT ERROR BIT IN MLDS
12536 ;          6168  !       FOR BEING SET AFTER EACH
12537 ;          6169  !       WRITE.
12538 ;          6170  !
12539 ;          6171  !--
12540 ;          6172
12541 ;          6173  local
12542 ;          6174      DAT_PAT,                          !DATA PATTERN
12543 ;          6175      SKIP_MASK;                        !POINTS TO MLER READ ONLY BITS
12544 ;          6176
12545 ;          6177  CLR_MBUS;
12546 ;          6178  SKIP_MASK = %o'163157';               !LOAD SKIP MASK
12547 ;          6179  DAT_PAT = ONE;                        !DATA PATTERN SET BIT 0 IN MLER
12548 ;          6180
12549 ;          6181  incr COUNT from 0 to 15 do            !WRITE AND SHIFT DATA PAT TO MLER 16 TIMES
12550 ;          6182      begin
12551 ;          6183
12552 ;          6184      if (.DAT_PAT and .SKIP_MASK) neq ZERO     !SKIP IF DAT_PAT FALLS ON READ ONLY BIT
12553 ;          6185      then
12554 ;          6186          begin
12555 ;          6187          BGNSUB;
12556 ;          6188          MLER = .DAT_PAT;              !WRITE DATA_PAT TO MLER
12557 ;          6189
12558 ;          6190          if .COMP_ERR IS_NOT_SET       !SEE IF DAT_PAT CAUSED A COMP ERROR
12559 ;          6191          then
12560 ;          6192              begin
12561 ;          6193              ERRDF (50, ASYNC, DUMPER);        !ERROR IF NO COMP ERROR
12562 ;          6194              PRINTB (FOR_FMT, FNC_8, PHR_1, WRD_12, FNC_8);
12563 ;          6195              PRINTB (FMT_4, .DAT_PAT);
12564 ;          6196              end;
12565 ;          6197
12566 ;          6198          ENDSUB;
12567 ;          6199          end;
12568 ;          6200
12569 ;          6201      DAT_PAT = .DAT_PAT^ONE;           !SHIFT DAT_PAT TO NEXT BIT AND REPEAT
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (70)

;          6202      end;
;          6203
;          6204  ENDTST;

                                        .SBTTL  $T18 TEST CODE SECTION
045060  004167  137470          $T18:   JSR     R1,$SAVE3                       ;                                       6148
045064  152777  000040  150352          BISB    #40,@ML.REG+40                  ;                                       6175
045072  016703  150734                  MOV     ML.DUT,R3
045076  042703  177770                  BIC     #177770,R3
045102  142777  000007  150334          BICB    #7,@ML.REG+40
045110  150377  150330                  BISB    R3,@ML.REG+40
045114  012703  163157                  MOV     #-14621,R3                      ; *,SKIP.MASK                           6178
045120  012701  000001                  MOV     #1,R1                           ; *,DAT.PAT                             6179
045124  005002                          CLR     R2                              ; COUNT                                 6181
045126  030103                  1$:     BIT     R1,R3                           ; DAT.PAT,SKIP.MASK                     6184
045130  001445                          BEQ     4$
045132  104402                  2$:     TRAP    2                               ;                                       6186
045134  010177  150324                  MOV     R1,@ML.REG+60                   ; DAT.PAT,*                             6188
045140  032777  040000  150306          BIT     #40000,@ML.REG+50               ;                                       6190
045146  001033                          BNE     3$
045150  104455                          TRAP    55                              ;                                       6193
045152  000062                          .WORD   62
045154  012706                          .WORD   ASYNC
045156  026302                          .WORD   DUMPER
045160  012746  012244                  MOV     #FNC.8,-(SP)                    ;                                       6194
045164  012746  010650                  MOV     #WRD.12,-(SP)
045170  012746  011610                  MOV     #PHR.1,-(SP)
045174  012746  012244                  MOV     #FNC.8,-(SP)
045200  012746  010270                  MOV     #FOR.FMT,-(SP)
045204  012746  000005                  MOV     #5,-(SP)
045210  010600                          MOV     SP,R0                           ; SP,*
045212  104414                          TRAP    14
045214  010116                          MOV     R1,(SP)                         ; DAT.PAT,*                             6195
045216  012746  006620                  MOV     #FMT.4,-(SP)
045222  012746  000002                  MOV     #2,-(SP)
045226  010600                          MOV     SP,R0                           ; SP,*
045230  104414                          TRAP    14
045232  062706  000020                  ADD     #20,SP                          ;                                       6192
045236  104467                  3$:     TRAP    67                              ;                                       6196
045240  006000                          ROR     R0
045242  103733                          BLO     2$
045244  006301                  4$:     ASL     R1                              ; DAT.PAT                               6201
045246  005202                          INC     R2                              ; COUNT                                 6181
045250  020227  000017                  CMP     R2,#17                          ; COUNT,*
045254  003724                          BLE     1$
045256  000207                          RTS     PC                              ;                                       6148
```

```
                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<


                                        ; Routine Size:  64 words
                                        ; Maximum stack depth per invocation:  12 words


                                                .SBTTL  T18 TEST CODE SECTION
045260                                  T18::
045260  004767  177574                  1$:     JSR     PC,$T18                 ;                       6202
045264  104466                                  TRAP    66
045266  006000                                  ROR     R0
045270  103773                                  BLO     1$
045272  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;       6205  !<BLF/PAGE>
```

```
12664 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
12665 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (71)
12666 ;
12667 ;          6206  !
12668 ;          6207  !
12669 ;          6208  BGNTST;
12670 ;          6209
12671 ;          6210  !++
12672 ;          6211  ! TEST NUMBER:  TST 19
12673 ;          6212  !
12674 ;          6213  ! TEST NAME:    ATA BIT TEST
12675 ;          6214  !
12676 ;          6215  ! TEST DESCRIPTION:
12677 ;          6216  !
12678 ;          6217  !       TEST THE ATA BIT FOR SETTING
12679 ;          6218  !       BY:
12680 ;          6219  !
12681 ;          6220  !       1.  SETTING A BIT IN THE ERROR
12682 ;          6221  !           REGISTER.
12683 ;          6222  !
12684 ;          6223  !           TEST THE ATA BIT FOR CLEARING
12685 ;          6224  !           AFTER BEING SET BY:
12686 ;          6225  !           1.  WRITING A FUNCTION TO MLCS1.
12687 ;          6226  !           2.  WRITING A ONE INTO THIS
12688 ;          6227  !               UNITS ATA BIT
12689 ;          6228  !
12690 ;          6229  !       TEST THE ATA BIT FOR NOT CLEARING
12691 ;          6230  !       AFTER BEING SET BY:
12692 ;          6231  !
12693 ;          6232  !       1.  WRITING A ONE INTO THE
12694 ;          6233  !           ATA BIT OF THE OTHER
12695 ;          6234  !           UNITS.
12696 ;          6235  !
12697 ;          6236  !--
12698 ;          6237
12699 ;          6238  local
12700 ;          6239      ATA_SAVE : bitvector [8],          !STORES ALL 8 ATA BITS ON READS AND WRITES
12701 ;          6240      DAT_PAT;                           !DATA PATTERN
12702 ;          6241
12703 ;          6242  CLR_MBUS;
12704 ;          6243  MLER = ONE;                            !SET THE ATA BIT
12705 ;          6244  MLER = ZERO;
12706 ;          6245  ATA_SAVE = .MLAS;                      !READ THE ATTN REGISTER
12707 ;          6246
12708 ;          6247  if .ATA_SAVE [.ML_DUT] IS_NOT_SET      !SEE IF THIS DRIVES ATA BIT IS SET
12709 ;          6248  then
12710 ;          6249      begin
12711 ;          6250      ERRDF (51, ASYNC, DUMPER);         !ERROR AND EXIT_TST IF NOT SET
12712 ;          6251      PRINTB (FOR_FMT, WRD_15, PHR_1, WRD_11, FNC_8);
12713 ;          6252      EXIT_TST;
12714 ;          6253      end;
12715 ;          6254
12716 ;          6255  if .ATTN IS_NOT_SET                    !SEE IF THE ATTN BIT IS SET
12717 ;          6256  then
12718 ;          6257      begin
```

```
12720 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
12721 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (71)
12722 ;
12723 ;         6258        ERRDF (52, ASYNC, DUMPER);                  !ERROR AND EXIT_TST IF NOT SET
12724 ;         6259        PRINTB (FIV_FMT, REG_2, WRD_16, PHR_1, WRD_11, FNC_8);
12725 ;         6260        EXIT_TST;
12726 ;         6261        end;
12727 ;         6262
12728 ;         6263    MLCS1 = NOOP;                               !TRY TO CLEAR THE ATA BIT WITH NOOP FUNC
12729 ;         6264
12730 ;         6265    if .ATTN IS_SET                             !SEE IF ATA GOT CLEARED
12731 ;         6266    then
12732 ;         6267        begin
12733 ;         6268        ERRDF (53, ASYNC, DUMPER);              !ERROR AND EXIT_TST IF SET
12734 ;         6269        PRINTB (FOR_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
12735 ;         6270        EXIT_TST;
12736 ;         6271        end;
12737 ;         6272
12738 ;         6273    ATA_SAVE = .MLAS;                           !READ THE ATTENTION REGISTER
12739 ;         6274
12740 ;         6275    if .ATA_SAVE [.ML_DUT] IS_SET               !SEE IF THE ATA REG GOT CLEARED BY NO-OP
12741 ;         6276    then
12742 ;         6277        begin
12743 ;         6278        ERRDF (58, ASYNC, DUMPER);
12744 ;         6279        PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
12745 ;         6280        end;
12746 ;         6281
12747 ;         6282    BGNSUB;
12748 ;         6283    MLER = ONE;                                 !SET THE ATA BIT
12749 ;         6284    MLER = ZERO;
12750 ;         6285    ATA_SAVE = ZEROES;                          !CLEAR ATA_SAVE
12751 ;         6286    ATA_SAVE [.ML_DUT] = ONE;                   !SET ATA_SAVE FOR THIS DRIVE
12752 ;         6287    MLAS = .ATA_SAVE;                           !TRY TO CLEAR THE ATA BY WRITING TO IT.
12753 ;         6288
12754 ;         6289    if .ATTN IS_SET                             !SEE IF THE ATA GOT CLEARED
12755 ;         6290    then
12756 ;         6291        begin
12757 ;         6292        ERRDF (54, ASYNC, DUMPER);              !ERROR IF NOT CLEARED
12758 ;         6293        PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, WRD_17, REG_5);
12759 ;         6294        end;
12760 ;         6295
12761 ;         6296    ENDSUB;
12762 ;         6297    BGNSUB;
12763 ;         6298    MLER = ONE;                                 !SET THE ATA BIT
12764 ;         6299    MLER = ZERO;
12765 ;         6300    DAT_PAT = ONE;                              !DATA PATTERN OF ONE IN FIELD OF ZEROES
12766 ;         6301
12767 ;         6302    incr ATA_SEL from 0 to 7 do                 !REPEAT LOOP 8 TIMES
12768 ;         6303        begin
12769 ;         6304
12770 ;         6305        if .ATA_SEL neq .ML_DUT                 !SKIP IF ATA_SEL EQLS THIS DRIVE NO.
12771 ;         6306        then
12772 ;         6307            begin
12773 ;         6308            MLAS = .DAT_PAT;                    !WRITE DAT PAT TO ATA REGISTER
12774 ;         6309            ATA_SAVE = .MLAS;                   !READ ATA REG BACK
```

```
  12776 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
  12777 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (71)
  12778
  12779 ;          6310
  12780 ;          6311          if .ATA_SAVE [.ML_DUT] IS_NOT_SET       !SEE IF THIS DRIVE ATA IS CLEARED
  12781 ;          6312          then
  12782 ;          6313              begin
  12783 ;          6314              ERRDF (55, ASYNC, DUMPER);          !ERROR AND EXIT LOOP IF CLEARED
  12784 ;          6315              PRINTB (SIX_FMT, WRD_15, PHR_6, WRD_11, WRD_17, REG_5, PHR_7);
  12785 ;          6316              PRINTB (FMT_7, .DAT_PAT);
  12786 ;          6317              exitloop;
  12787 ;          6318              end;
  12788 ;          6319
  12789 ;          6320          end;
  12790 ;          6321
  12791 ;          6322      DAT_PAT = .DAT_PAT^ONE;                 !SHIFT DAT_PAT AND REPEAT
  12792 ;          6323      end;
  12793 ;          6324
  12794 ;          6325  ENDSUB;
  12795 ;          6326  ENDTST;
  12799
  12800                                          .SBTTL  $T19 TEST CODE SECTION
  12804 045274  004167  137254          $T19:   JSR     R1,$SAVE3                       ;                       6204
  12805 045300  152777  000040  150136          BISB    #40,@ML.REG+40                  ;                       6240
  12806 045306  016703  150520                  MOV     ML.DUT,R3
  12807 045312  042703  177770                  BIC     #177770,R3
  12808 045316  142777  000007  150120          BICB    #7,@ML.REG+40
  12809 045324  150377  150114                  BISB    R3,@ML.REG+40
  12810 045330  012777  000001  150126          MOV     #1,@ML.REG+60                   ;                       6243
  12811 045336  005077  150122                  CLR     @ML.REG+60                      ;                       6244
  12812 045342  017746  150126                  MOV     @ML.REG+70,-(SP)                ; *,ATA.SAVE            6245
  12813 045346  016701  150460                  MOV     ML.DUT,R1                       ;                       6247
  12814 045352  006201                          ASR     R1
  12815 045354  006201                          ASR     R1
  12816 045356  006201                          ASR     R1
  12817 045360  010600                          MOV     SP,R0                           ; ATA.SAVE,*
  12818 045362  060001                          ADD     R0,R1
  12819 045364  010146                          MOV     R1,-(SP)
  12820 045366  016746  150440                  MOV     ML.DUT,-(SP)
  12821 045372  042716  177770                  BIC     #177770,(SP)
  12822 045376  012746  000001                  MOV     #1,-(SP)
  12823 045402  005046                          CLR     -(SP)
  12824 045404  004767  136224                  JSR     PC,BL$GT2
  12825 045410  062706  000010                  ADD     #10,SP
  12826 045414  005700                          TST     R0
  12827 045416  001026                          BNE     1$
  12828 045420  104455                          TRAP    55                              ;                       6250
  12829 045422  000063                          .WORD   63
  12830 045424  012706                          .WORD   ASYNC
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

045426  026302                                  .WORD   DUMPER
045430  012746  012244                          MOV     #FNC.8,-(SP)                    ;                                6251
045434  012746  010640                          MOV     #WRD.11,-(SP)
045440  012746  011610                          MOV     #PHR.1,-(SP)
045444  012746  010676                          MOV     #WRD.15,-(SP)
045450  012746  010270                          MOV     #FOR.FMT,-(SP)
045454  012746  000005                          MOV     #5,-(SP)
045460  010600                                  MOV     SP,R0                           ; SP,*
045462  104414                                  TRAP    14
045464  104463                                  TRAP    63
045466  062706  000014                          ADD     #14,SP                          ;                                6247
045472  000467                                  BR      4$                              ;                                6249
045474  032777  100000  147752  1$:             BIT     #100000,@ML.REG+50              ;                                6255
045502  001026                                  BNE     2$
045504  104455                                  TRAP    55                              ;                                6258
045506  000064                                  .WORD   64
045510  012706                                  .WORD   ASYNC
045512  026302                                  .WORD   DUMPER
045514  012746  012244                          MOV     #FNC.8,-(SP)                    ;                                6259
045520  012746  010640                          MOV     #WRD.11,-(SP)
045524  012746  011610                          MOV     #PHR.1,-(SP)
045530  012746  010704                          MOV     #WRD.16,-(SP)
045534  012746  012510                          MOV     #REG.2,-(SP)
045540  012746  010304                          MOV     #FIV.FMT,-(SP)
045544  012746  000006                          MOV     #6,-(SP)
045550  010600                                  MOV     SP,R0                           ; SP,*
045552  104414                                  TRAP    14
045554  104463                                  TRAP    63
045556  000433                                  BR      3$                              ;                                6255
045560  012777  000001  147616  2$:             MOV     #1,@ML.REG                      ;                                6263
045566  005777  147662                          TST     @ML.REG+50                      ;                                6265
045572  100031                                  BPL     5$
045574  104455                                  TRAP    55                              ;                                6268
045576  000065                                  .WORD   65
045600  012706                                  .WORD   ASYNC
045602  026302                                  .WORD   DUMPER
045604  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                6269
045610  012746  012164                          MOV     #FNC.2,-(SP)
045614  012746  010640                          MOV     #WRD.11,-(SP)
045620  012746  011626                          MOV     #PHR.2,-(SP)
045624  012746  010676                          MOV     #WRD.15,-(SP)
045630  012746  010270                          MOV     #FOR.FMT,-(SP)
045634  012746  000006                          MOV     #6,-(SP)
045640  010600                                  MOV     SP,R0                           ; SP,*
045642  104414                                  TRAP    14
045644  104463                                  TRAP    63
045646  062706  000016          3$:             ADD     #16,SP                          ;                                6265
045652  000167  000546          4$:             JMP     12$                             ;                                6267
045656  017716  147612          5$:             MOV     @ML.REG+70,(SP)                 ; *,ATA.SAVE                     6273
045662  016701  150144                          MOV     ML.DUT,R1                       ;                                6275
045666  006201                                  ASR     R1
04567[illegible]  006201                          ASR     R1
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

045672  006201                                  ASR     R1
045674  010600                                  MOV     SP,R0                           ; ATA.SAVE,*
045676  060001                                  ADD     R0,R1
045700  010146                                  MOV     R1,-(SP)
045702  016746  150124                          MOV     ML.DUT,-(SP)
045706  042716  177770                          BIC     #177770,(SP)
045712  012746  000001                          MOV     #1,-(SP)
045716  005046                                  CLR     -(SP)
045720  004767  135710                          JSR     PC,BL$GT2
045724  062706  000010                          ADD     #10,SP
045730  005300                                  DEC     R0
045732  001026                                  BNE     6$
045734  104455                                  TRAP    55                              ;                                       6278
045736  000072                                  .WORD   72
045740  012706                                  .WORD   ASYNC
045742  026302                                  .WORD   DUMPER
045744  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       6279
045750  012746  012164                          MOV     #FNC.2,-(SP)
045754  012746  010640                          MOV     #WRD.11,-(SP)
045760  012746  011626                          MOV     #PHR.2,-(SP)
045764  012746  010676                          MOV     #WRD.15,-(SP)
045770  012746  010304                          MOV     #FIV.FMT,-(SP)
045774  012746  000006                          MOV     #6,-(SP)
046000  010600                                  MOV     SP,R0                           ; SP,*
046002  104414                                  TRAP    14
046004  062706  000016                          ADD     #16,SP                          ;                                       6277
046010  104402                          6$:     TRAP    2                               ;                                       6280
046012  012777  000001  147444                  MOV     #1,@ML.REG+60                   ;                                       6283
046020  005077  147440                          CLR     @ML.REG+60                      ;                                       6284
046024  005016                                  CLR     (SP)                            ; ATA.SAVE                              6285
046026  016701  150000                          MOV     ML.DUT,R1                       ;                                       6286
046032  006201                                  ASR     R1
046034  006201                                  ASR     R1
046036  006201                                  ASR     R1
046040  010600                                  MOV     SP,R0                           ; ATA.SAVE,*
046042  060001                                  ADD     R0,R1
046044  010146                                  MOV     R1,-(SP)
046046  016746  147760                          MOV     ML.DUT,-(SP)
046052  042716  177770                          BIC     #177770,(SP)
046056  012746  000001                          MOV     #1,-(SP)
046062  011646                                  MOV     (SP),-(SP)
046064  004767  136002                          JSR     PC,BL$PU2
046070  016677  000010  147376                  MOV     10(SP),@ML.REG+70               ; ATA.SAVE,*                            6287
046076  005777  147352                          TST     @ML.REG+50                      ;                                       6289
046102  100026                                  BPL     7$
046104  104455                                  TRAP    55                              ;                                       6292
046106  000066                                  .WORD   66
046110  012706                                  .WORD   ASYNC
046112  026302                                  .WORD   DUMPER
046114  012746  012532                          MOV     #REG.5,-(SP)                    ;                                       6293
046120  012746  010712                          MOV     #WRD.17,-(SP)
046124  012746  010640                          MOV     #WRD.11,-(SP)
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        MOV     #PHR.2,-(SP)
                                        MOV     #WRD.15,-(SP)
                                        MOV     #FIV.FMT,-(SP)
                                        MOV     #6,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        ADD     #16,SP                  ;                                       6291
                                7$:     ADD     #10,SP                  ;                                       6280
                                        TRAP    67                      ;                                       6294
                                        ROR     R0
                                        BLO     6$
                                8$:     TRAP    2                       ;                                       6296
                        147262          MOV     #1,@ML.REG+60           ;                                       6293
                                        CLR     @ML.REG+60              ;                                       6299
                                        MOV     #1,R3                   ; *,DAT.PAT                             6300
                                        CLR     R2                      ; ATA.SEL                               6302
                                9$:     CMP     R2,ML.DUT               ; ATA.SEL,*                             6305
                                        BEQ     10$
                                        MOV     R3,@ML.REG+70           ; DAT.PAT,*                             6308
                                        MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE                            6309
                                        MOV     ML.DUT,R1               ;                                       6311
                                        ASR     R1
                                        ASR     R1
                                        ASR     R1
                                        MOV     SP,R0                   ; ATA.SAVE,*
                                        ADD     R0,R1
                                        MOV     R1,-(SP)
                                        MOV     ML.DUT,-(SP)
                                        BIC     #177770,(SP)
                                        MOV     #1,-(SP)
                                        CLR     -(SP)
                                        JSR     PC,BL$GT2
                                        ADD     #10,SP
                                        TST     R0
                                        BNE     10$
                                        TRAP    55                      ;                                       6314
                                        .WORD   67
                                        .WORD   ASYNC
                                        .WORD   DUMPER
                                        MOV     #PHR.7,-(SP)            ;                                       6315
                                        MOV     #REG.5,-(SP)
                                        MOV     #WRD.17,-(SP)
                                        MOV     #WRD.11,-(SP)
                                        MOV     #PHR.6,-(SP)
                                        MOV     #WRD.15,-(SP)
                                        MOV     #SIX.FMT,-(SP)
                                        MOV     #7,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     R3,(SP)                 ; DAT.PAT,*                             6316
                                        MOV     #FMT.7,-(SP)
                                        MOV     #2,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

046372  010600                                  MOV     SP,R0                           ; SP,*
046374  104414                                  TRAP    14
046376  062706  000024                          ADD     #24,SP                          ;                                       6317
046402  000405                                  BR      11$
046404  006303                          10$:    ASL     R3                              ; DAT.PAT                               6322
046406  005202                                  INC     R2                              ; ATA.SEL                               6302
046410  020227  000007                          CMP     R2,#7                           ; ATA.SEL,*
046414  003677                                  BLE     9$
046416  104467                          11$:    TRAP    67                              ;                                       6323
046420  006000                                  ROR     R0
046422  103663                                  BLO     8$
046424  005726                          12$:    TST     (SP)+                           ;                                       6204
046426  000207                                  RTS     PC

                                        ; Routine Size:  302 words
                                        ; Maximum stack depth per invocation:  16 words



                                                .SBTTL  T19 TEST CODE SECTION
046430                                  T19::
046430  004767  176640                  1$:     JSR     PC,$T19                         ;                                       6325
046434  104466                                  TRAP    66
046436  006000                                  ROR     R0
046440  103773                                  BLO     1$
046442  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          6327  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (72)

```
;ML4AD
;                TEST CODE SECTION

;          6328  !
;          6329  !
;          6330  BGNTST;
;          6331
;          6332  !++
;          6333  ! TEST NUMBER:  TST 20
;          6334  !
;          6335  ! TEST NAME:    SEARCH FUNCTION TEST
;          6336  !
;          6337  ! TEST DESCRIPTION:
;          6338  !
;          6339  !       TEST THE SEARCH FUNCTION BY:
;          6340  !
;          6341  !       1.  DOING A SEARCH FUNCTION AT
;          6342  !           ARRAY ZERO AND TEST GO,
;          6343  !           ERROR BITS AND ATTN FOR
;          6344  !           SETTING/NOT SETTING.
;          6345  !
;          6346  !       2.  DOING SEARCH FUNCTIONS AT ALL
;          6347  !           PRESENT ARRAYS' AND TEST ATTN
;          6348  !           SET
;          6349  !
;          6350  !       3.  DOING SEARCH FUNCTIONS AT ALL
;          6351  !           NOT PRESENT ARRAYS' AND TEST
;          6352  !           ATTN CLEARED.
;          6353  !
;          6354  !--
;          6355
;          6356  CLR_MBUS;
;          6357  MLDA = ZEROES;
;          6358  MLCS1 = SEARCH;                          !DO A SEARCH FUNCTION
;          6359
;          6360  if .GO IS_SET                           !SEE IF GO IS SET
;          6361  then
;          6362      begin
;          6363      ERRDF (56, ASYNC, DUMPER);           !ERROR IF NOT SET
;          6364      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_10, WRD_19);
;          6365      end;
;          6366
;          6367  if .ILF IS_SET                           !SEE IF ILF IS SET
;          6368  then
;          6369      begin
;          6370      ERRDF (57, ASYNC, DUMPER);           !ERROR IF SET
;          6371      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, FNC_10, WRD_19);
;          6372      end;
;          6373
;          6374  if .ATTN IS_NOT_SET                      !SEE IF ATTN IS SET
;          6375  then
;          6376      begin
;          6377      ERRDF (59, ASYNC, DUMPER);           !ERROR IF NOT SET
;          6378      PRINTB (FIV_FMT, WRD_16, PHR_1, WRD_12, FNC_10, WRD_19);
;          6379      end
```

```
13106 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
13107 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (72)
13108
13109 ;          6380  else
13110 ;          6381      begin
13111 ;          6382
13112 ;          6383      CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
13113 ;          6384
13114 ;          6385  !
13115 ;          6386  ! VERSION CZMLAD CHANGED INCR TO INCRU
13116 ;          6387  !
13117 ;          6388      incru ARR_SEL from 0 to .LST_ARR by .ARR_INC do     !DO SEARCH AT ALL PRESENT ARRAYS
13118 ;          6389          begin
13119 ;          6390          BGNSUB;
13120 ;          6391          CLR_MBUS;
13121 ;          6392          MLDA = .ARR_SEL;                        !LOAD DSA REG WITH ARR_SEL
13122 ;          6393          MLCS1 = SEARCH;                         !DO A SEARCH FUNCTION
13123 ;          6394
13124 ;          6395          if .OPI IS_SET                          !READ ATTN
13125 ;          6396          then
13126 ;          6397              begin
13127 ;          6398              CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
13128 ;          6399              ERRDF (60, ASYNC, DUMPER);          !ERROR IF NOT SET
13129 ;          6400              PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_10, WRD_19);
13130 ;          6401              PRINTB (FMT_9, .ARR_SEL);
13131 ;          6402              end;
13132 ;          6403
13133 ;          6404          ENDSUB;
13134 ;          6405          end;
13135 ;          6406
13136 ;          6407      CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
13137 ;          6408
13138 ;          6409      if .OP_NUM_ARR lss %o'000017'               !SEE IF LSS 17 ARRAYS ARE PRESENT
13139 ;          6410      then
13140 ;          6411
13141 ;          6412  !
13142 ;          6413  ! VERSION CZMLAD CHANGED INCR TO INCRU
13143 ;          6414  !
13144 ;          6415          incru ARR_SEL from (.LST_ARR + .ARR_INC) to .ARR_16 by .ARR_INC do
13145 ;          6416                                                  !DO A SEARCH AT ALL NOT PRESENT
13146 ;          6417              begin                               !ARRAYS IF LSS 17
13147 ;          6418              BGNSUB;
13148 ;          6419              CLR_MBUS;
13149 ;          6420              MLDA = .ARR_SEL;                    !LOAD DSA REG WITH ARR_SEL
13150 ;          6421              MLCS1 = SEARCH;                     !DO A SEARCH FUNCTION
13151 ;          6422
13152 ;          6423              if .OPI IS_NOT_SET                  !SEE IF OPI IS SET
13153 ;          6424              then
13154 ;          6425                  begin
13155 ;          6426                  CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
13156 ;          6427                  ERRDF (61, ASYNC, DUMPER);      !ERROR IF NOT SET
13157 ;          6428                  PRINTB (FIV_FMT, WRD_4, PHR_1, WRD_12, FNC_10, WRD_19);
13158 ;          6429                  PRINTB (FMT_9, .ARR_SEL);
13159 ;          6430                  end;
13160 ;          6431
```

```
13162 ;ML4AD
13163 ;                 TEST CODE SECTION
13164
13165 ;          6432                 ENDSUB;
13166 ;          6433                 end;
13167 ;          6434
13168 ;          6435      end;
13169 ;          6436
13170 ;          6437  ENDTST;
13174
13175                                          .SBTTL  $T20 TEST CODE SECTION
13179 046444  004167  136104          $T20:   JSR     R1,$SAVE3                       ;                6326
13180 046450  152777  000040  146766          BISB    #40,@ML.REG+40                  ;                6330
13181 046456  016703  147350                  MOV     ML.DUT,R3
13182 046462  042703  177770                  BIC     #177770,R3
13183 046466  142777  000007  146750          BICB    #7,@ML.REG+40
13184 046474  150377  146744                  BISB    R3,@ML.REG+40
13185 046500  005077  146730                  CLR     @ML.REG+30                      ;                6357
13186 046504  012777  000031  146672          MOV     #31,@ML.REG                     ;                6358
13187 046512  132777  000001  146664          BITB    #1,@ML.REG                      ;                6360
13188 046520  001426                          BEQ     1$
13189 046522  104455                          TRAP    55                              ;                6363
13190 046524  000070                          .WORD   70
13191 046526  012706                          .WORD   ASYNC
13192 046530  026302                          .WORD   DUMPER
13193 046532  012746  010730                  MOV     #WRD.19,-(SP)                   ;                6364
13194 046536  012746  012272                  MOV     #FNC.10,-(SP)
13195 046542  012746  010640                  MOV     #WRD.11,-(SP)
13196 046546  012746  011626                  MOV     #PHR.2,-(SP)
13197 046552  012746  010520                  MOV     #WRD.1,-(SP)
13198 046556  012746  010304                  MOV     #FIV.FMT,-(SP)
13199 046562  012746  000006                  MOV     #6,-(SP)
13200 046566  010600                          MOV     SP,R0                           ; SP,*
13201 046570  104414                          TRAP    14
13202 046572  062706  000016                  ADD     #16,SP                          ;                6362
13203 046576  132777  000001  146660  1$:     BITB    #1,@ML.REG+60                   ;                6367
13204 046604  001430                          BEQ     2$
13205 046606  104455                          TRAP    55                              ;                6370
13206 046610  000071                          .WORD   71
13207 046612  012706                          .WORD   ASYNC
13208 046614  026302                          .WORD   DUMPER
13209 046616  012746  010730                  MOV     #WRD.19,-(SP)                   ;                6371
13210 046622  012746  012272                  MOV     #FNC.10,-(SP)
13211 046626  012746  012302                  MOV     #FNC.11,-(SP)
13212 046632  012746  010640                  MOV     #WRD.11,-(SP)
13213 046636  012746  011714                  MOV     #PHR.5,-(SP)
13214 046642  012746  010536                  MOV     #WRD.3,-(SP)
13215 046646  012746  010304                  MOV     #FIV.FMT,-(SP)
13216 046652  012746  000007                  MOV     #7,-(SP)
```

29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

```
13218                                   ;ML4AD
13219                                   ;       TEST CODE SECTION
13220
13221 046656 010600                             MOV     SP,R0           ; SP,*
13222 046660 104414                             TRAP    14
13223 046662 062706 000020                      ADD     #20,SP          ;                       6369
13224 046666 032777 100000 146560       2$:     BIT     #100000,@ML.REG+50      ;               6374
13225 046674 001027                             BNE     3$
13226 046676 104455                             TRAP    55              ;                       6377
13227 046700 000073                             .WORD   73
13228 046702 012706                             .WORD   ASYNC
13229 046704 026302                             .WORD   DUMPER
13230 046706 012746 010730                      MOV     #WRD.19,-(SP)   ;                       6378
13231 046712 012746 012272                      MOV     #FNC.10,-(SP)
13232 046716 012746 010650                      MOV     #WRD.12,-(SP)
13233 046722 012746 011610                      MOV     #PHR.1,-(SP)
13234 046726 012746 010704                      MOV     #WRD.16,-(SP)
13235 046732 012746 010304                      MOV     #FIV.FMT,-(SP)
13236 046736 012746 000006                      MOV     #6,-(SP)
13237 046742 010600                             MOV     SP,R0           ; SP,*
13238 046744 104414                             TRAP    14
13239 046746 062706 000016                      ADD     #16,SP          ;                       6376
13240 046752 000207                             RTS     PC              ;                       6374
13241 046754 005067 146416              3$:     CLR     P.CNT           ;                       6381
13242 046760 016702 145034                      MOV     LST.ARR,R2      ;                       6388
13243 046764 016703 145014                      MOV     ARR.INC,R3
13244 046770 005001                             CLR     R1              ; ARR.SEL
13245 046772 000475                             BR      7$
13246 046774 104402                     4$:     TRAP    2               ;                       6389
13247 046776 152777 000040 146440               BISB    #40,@ML.REG+40  ;                       6390
13248 047004 016700 147022                      MOV     ML.DUT,R0
13249 047010 042700 177770                      BIC     #177770,R0
13250 047014 142777 000007 146422               BICB    #7,@ML.REG+40
13251 047022 150077 146416                      BISB    R0,@ML.REG+40
13252 047026 010177 146402                      MOV     R1,@ML.REG+30   ; ARR.SEL,*             6392
13253 047032 012777 000031 146344               MOV     #31,@ML.REG     ;                       6393
13254 047040 032777 020000 146416               BIT     #20000,@ML.REG+60       ;               6395
13255 047046 001443                             BEQ     5$
13256 047050 005267 146322                      INC     P.CNT           ;                       6397
13257 047054 026767 146316 146316               CMP     P.CNT,LIMIT
13258 047062 003040                             BGT     6$
13259 047064 104455                             TRAP    55              ;                       6399
13260 047066 000074                             .WORD   74
13261 047070 012706                             .WORD   ASYNC
13262 047072 026302                             .WORD   DUMPER
13263 047074 012746 010730                      MOV     #WRD.19,-(SP)   ;                       6400
13264 047100 012746 012272                      MOV     #FNC.10,-(SP)
13265 047104 012746 010650                      MOV     #WRD.12,-(SP)
13266 047110 012746 011714                      MOV     #PHR.5,-(SP)
13267 047114 012746 010544                      MOV     #WRD.4,-(SP)
13268 047120 012746 010304                      MOV     #FIV.FMT,-(SP)
13269 047124 012746 000006                      MOV     #6,-(SP)
13270 047130 010600                             MOV     SP,R0           ; SP,*
13271 047132 104414                             TRAP    14
13272 047134 010116                             MOV     R1,(SP)         ; ARR.SEL,*             6401
```

```
13274                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
13275                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
13276
13277 047136  012746  007064                    MOV     #FMT.9,-(SP)
13278 047142  012746  000002                    MOV     #2,-(SP)
13279 047146  010600                            MOV     SP,R0           ; SP,*
13280 047150  104414                            TRAP    14
13281 047152  062706  000022                    ADD     #22,SP          ;                               6397
13282 047156  104467                    5$:     TRAP    67              ;                               6402
13283 047160  006000                            ROR     R0
13284 047162  103704                            BLO     4$
13285 047164  060301                    6$:     ADD     R3,R1           ; *,ARR.SEL                     6388
13286 047166  020102                    7$:     CMP     R1,R2           ; ARR.SEL,*
13287 047170  101701                            BLOS    4$
13288 047172  005067  146200                    CLR     P.CNT           ;                               6405
13289 047176  026727  144600  000017            CMP     OP.NUM.ARR,#17  ;                               6409
13290 047204  002110                            BGE     12$
13291 047206  016701  144606                    MOV     LST.ARR,R1      ;                               6415
13292 047212  066701  144566                    ADD     ARR.INC,R1
13293 047216  016703  144574                    MOV     ARR.16,R3
13294 047222  016702  144556                    MOV     ARR.INC,R2
13295 047226  000475                            BR      11$
13296 047230  104402                    8$:     TRAP    2               ;                               6417
13297 047232  152777  000040  146204            BISB    #40,@ML.REG+40  ;                               6418
13298 047240  016700  146566                    MOV     ML.DUT,R0
13299 047244  042700  177770                    BIC     #177770,R0
13300 047250  142777  000007  146166            BICB    #7,@ML.REG+40
13301 047256  150077  146162                    BISB    R0,@ML.REG+40
13302 047262  010177  146146                    MOV     R1,@ML.REG+30   ; ARR.SEL,*                     6420
13303 047266  012777  000031  146110            MOV     #31,@ML.REG     ;                               6421
13304 047274  032777  020000  146162            BIT     #20000,@ML.REG+60 ;                             6423
13305 047302  001043                            BNE     9$
13306 047304  005267  146066                    INC     P.CNT           ;                               6425
13307 047310  026767  146062  146062            CMP     P.CNT,LIMIT
13308 047316  003040                            BGT     10$
13309 047320  104455                            TRAP    55              ;                               6427
13310 047322  000075                            .WORD   75
13311 047324  012706                            .WORD   ASYNC
13312 047326  026302                            .WORD   DUMPER
13313 047330  012746  010730                    MOV     #WRD.19,-(SP)   ;                               6428
13314 047334  012746  012272                    MOV     #FNC.10,-(SP)
13315 047340  012746  010650                    MOV     #WRD.12,-(SP)
13316 047344  012746  011610                    MOV     #PHR.1,-(SP)
13317 047350  012746  010544                    MOV     #WRD.4,-(SP)
13318 047354  012746  010304                    MOV     #FIV.FMT,-(SP)
13319 047360  012746  000006                    MOV     #6,-(SP)
13320 047364  010600                            MOV     SP,R0           ; SP,*
13321 047366  104414                            TRAP    14
13322 047370  010116                            MOV     R1,(SP)         ; ARR.SEL,*                     6429
13323 047372  012746  007064                    MOV     #FMT.9,-(SP)
13324 047376  012746  000002                    MOV     #2,-(SP)
13325 047402  010600                            MOV     SP,R0           ; SP,*
13326 047404  104414                            TRAP    14
13327 047406  062706  000022                    ADD     #22,SP          ;                               6425
13328 047412  104467                    9$:     TRAP    67              ;                               6430
```

```
                                        ;ML4AD
                                        ;               TEST CODE SECTION

047414  006000                                  ROR     R0
047416  103704                                  BLO     8$
047420  060201                          10$:    ADD     R2,R1                   ; *,ARR.SEL                     6415
047422  020103                          11$:    CMP     R1,R3                   ; ARR.SEL,*
047424  101701                                  BLOS    8$
047426  000207                          12$:    RTS     PC                      ;                               6326

                                        ; Routine Size:  250 words
                                        ; Maximum stack depth per invocation:  13 words



                                                .SBTTL  T20 TEST CODE SECTION
047430                                  T20::
047430  004767  177010                  1$:     JSR     PC,$T20                 ;                               6435
047434  104466                                  TRAP    66
047436  006000                                  ROR     R0
047440  103773                                  BLO     1$
047442  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          6438  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<M ALE>ML4AD.BLI.4 (73)

;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 21
;          !
;          ! TEST NAME:    POWER FAIL TEST
;          !
;          ! TEST DESCRIPTION:
;          !       THIS TEST IS PART OF THE MANUAL INTERVENTION
;          !       TEST SECTION.  DRIVE CONDITIONS REVOLVING
;          !       AROUND POWER FAIL SITUATION ARE TEST FOR.
;          !       FUNCTION TESTED FOR ARE AS FOLLOWS:
;          !
;          !               1.  VV BIT SETTING AND CLEARING
;          !
;          !               2.  READ-IN-PRESET FUNCTION SETTING
;          !                   THE VV BIT.
;          !
;          !               3.  ECC INITIALIZE CLEARING OUT MEMORY
;          !                   WITH BAD BATTERY BACK-UP.
;          !
;          !               4.  DRIVE REGISTERS BEING CLEARED BY
;          !                   DC LO via 'MB_DIS LO'.
;          !
;          !               5.  UNSAFE BIT 'UNS' SETTING DURING AC
;          !                   POWER LOSS.
;          !--
;
;          local
;              SIZE,                                        !STORES THE SIZE OF MASS BUS TRANSFERS
;              DST,                                         !STORES THE DESTINATION ADRS OF MASS BUS TRANSFERS
;              SRC,                                         !STORES THE SOURCE ADRS OF MASS BUS TRANSFERS
;              DSA_CNT,                                     !COUNTS THE NUMBER OF BLOCK TRANSFERS DONE
;              ERR_FLG,                                     !ERROR FLAG
;              CLR_DATA,                                    !STORES THE EXPECTED CLEARED DATA FROM THE REGISTERS
;              index,                                !INDEX VALUE INTO ML_REG STRUCTURE TO ACCESS THE REGISTERS ADRS
;              WCE_CNT;                                     !COUNT THE NUMBER OF WRITE CHECK ERROR DETECTED
;
;          !+
;          ! PERFORM THIS TEST ONLY IF THE OPERATOR HAS
;          ! ENABLED MANUAL INTERVENTION TEST VIA THE S/W
;          ! QUESTIONS.
;          !-
;
;          if .INTERVEN                                     !DO THIS TEST IF INTERVEN IS SET
;          then
;              begin
;          !
;          !
;          ! PRINT WHICH TEST THIS IS
;          !
```

```
13429 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
13430 ;                  TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
13431
13432 ;          6491  !
13433 ;          6492      PRINTB (ONE_FMT, T_21);                    !PRINT T_21 MESSAGE
13434 ;          6493      BGNSUB;                                    !START SCOOP LOOP
13435 ;          6494  !
13436 ;          6495  !
13437 ;          6496  ! FIRST TEST THE VV BIT FOR SETTING.
13438 ;          6497  ! TO DO THIS FIRST SEE IF THE BIT IS
13439 ;          6498  ! ALREADY SET.  IF ALREADY SET THEN
13440 ;          6499  ! SEE IF THE READ-IN-PRESET FUNCTION
13441 ;          6500  ! CLEARS THE BIT.  IF NOT ALREADY SET
13442 ;          6501  ! THEN SEE IF THE READ-IN-PRESET FUNC
13443 ;          6502  ! SETS THE BIT.
13444 ;          6503  !
13445 ;          6504  !
13446 ;          6505      CLR_MBUS;                                  !CLEAR THE MASS BUS
13447 ;          6506
13448 ;          6507      if .VV                                     !IS THE VV BIT INITIALLY SET
13449 ;          6508      then                                       !THE VV BIT IS SET
13450 ;          6509          begin                                  !SEE IF THE READ-IN-PRESET FUNC CLEARS IT
13451 ;          6510          MLCS1 = RD_IN_PRE;                     !DO A READ IN PRESET FUNCTION
13452 ;          6511
13453 ;          6512          if not (.VV)                           !DID THE VV GET CLEARED
13454 ;          6513          then
13455 ;          6514              begin                              !THE VV GOT CLEARED
13456 ;          6515              ERRDF (149, ASYNC, DUMPER);        !REPORT THE ERROR TO THE OPERATOR
13457 ;          6516              PRINTB (ONE_FMT, VV_CLEAR);        !TELL WHAT THE ERROR IS
13458 ;          6517              end
13459 ;          6518
13460 ;          6519          end
13461 ;          6520      else                                       !THE VV BIT IS INITIALLY CLEARED
13462 ;          6521          begin                                  !SEE IF A READ-IN-PRESET FUNC SETS THE VV BIT
13463 ;          6522          MLCS1 = RD_IN_PRE;                     !DO A READ-IN-PRESET FUNCTION
13464 ;          6523
13465 ;          6524          if not (.VV)                           !DID THE VV BIT GET SET
13466 ;          6525          then
13467 ;          6526              begin                              !THE VV BIT DID NOT SET
13468 ;          6527              ERRDF (150, ASYNC, DUMPER);        !REPORT THE ERROR TO OPERATOR
13469 ;          6528              PRINTB (TWO_FMT, VV_NOT_SET, FNC_11);      !TELL WHAT THE ERROR IS
13470 ;          6529              end;
13471 ;          6530
13472 ;          6531          end;
13473 ;          6532
13474 ;          6533  !
13475 ;          6534  !
13476 ;          6535  ! NOW TEST DRIVE ERROR CONDITIONS TO SEE
13477 ;          6536  ! IF DOING A READ-IN-PRESET FUNCTION CAUSED
13478 ;          6537  ! ANY UNEXPECTED DRIVE ERRORS.
13479 ;          6538  !
13480 ;          6539  !
13481 ;          6540
13482 ;          6541      if .GO IS_SET                              !DID THE RD-IN-PRE FUNC HANG THE GO BIT
13483 ;          6542      then
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)

;          6543          begin                                  !THE GO BIT IS HUNG
;          6544          ERRDF (62, ASYNC, DUMPER);             !REPORT THE ERROR TO THE OPERATOR
;          6545          PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR IS
;          6546          end;
;          6547
;          6548      if .ILF IS_SET                             !DID THE RD-IN-PRE FUNC CAUSE A ILLEGAL FUNC ERROR
;          6549      then
;          6550          begin                                  !THE ILF BIT IS SET
;          6551          ERRDF (63, ASYNC, DUMPER);             !REPORT THE ERROR TO THE OPERATOR
;          6552          PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR IS
;          6553          end;
;          6554
;          6555      if .OPI IS_SET                             !DID THE RD-IN-PRE CAUSE A OPERATION INCOMPLETE ERROR
;          6556      then
;          6557          begin                                  !THE OPI BIT IS SET
;          6558          ERRDF (64, ASYNC, DUMPER);             !REPORT THE ERROR TO THE OPERATOR
;          6559          PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR
;          6560          end;
;          6561
;          6562      ENDSUB;                                    !END SCOOP LOOP
;          6563  !
;          6564  !
;          6565  ! NOW WE'LL TEST THE VV BIT FOR CLEARING
;          6566  ! AFTER POWER UP WITH BAD BATTERY BACK-UP,
;          6567  ! ECC INITIALIZE CLEARING MEMORY TO ZEROES
;          6568  ! AND DC LO CREATING 'MB_DIS_LO' AND CLEARING
;          6569  ! OUT DRIVE REGISTERS.
;          6570  !
;          6571  !
;          6572      BGNSUB;                                    !START SCOOP LOOP
;          6573      IO_BUF = ONES;                             !LOAD THE FIRST IO_BUF WORD WITH ONES DATA
;          6574      DSA_CNT = -1;                              !RESET THE DSA COUNTER
;          6575  !
;          6576  !
;          6577  ! WRITE A BACK GROUND OF ALL ONES TO
;          6578  ! ALL OF MEMORY.  THIS WILL PROVE IF
;          6579  ! ECC INIT TOOK PLACE AFTER POWER UP
;          6580  ! WITH BAD BATTERY BACK-UP.
;          6581  !
;          6582  !
;          6583
;          6584      do                                         !LOAD ALL OF MEMORY WITH ONES DATA
;          6585          begin
;          6586          BREAK;                                 !LOOK FOR A CONTROL C
;          6587          DSA_CNT = .DSA_CNT + 1;                !UP THE DSA COUNTER
;          6588          WRT_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);       !DO A BLOCK WRITE TRANSFER
;          6589          end
;          6590  !
;          6591  !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;          6592  !
;          6593      until .DSA_CNT eqlU .LST_BLK;              !REPEAT WRITING UNTIL THE LAST BLOCK IS WRITTEN
;          6594
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)

;          6595     ERR_FLG = ONE;                        !CLEAR THE ERROR FLAG
;          6596     CLR_MBUS;                             !CLEAR THE MASS BUS
;          6597 !
;          6598 !
;          6599 ! TELL THE OPERATOR THE SHUT OFF BOX
;          6600 ! POWER AND AS THE AC POWER IS GOING
;          6601 ! DOWN TEST 'UNS BIT' FOR SETTING.
;          6602 !
;          6603 !
;          6604     PRINTB (ONE_FMT, PWR_OFF);            !TELL THE OPERATOR TO TURN BOX POWER OFF
;          6605
;          6606     do                                    !SAMPLE THE UNS BIT UNTIL THE DRIVE TIMES OUT
;          6607         begin
;          6608         BREAK;                            !LOOK FOR A CONTROL C
;          6609
;          6610         if .UNS                           !IS THE UNS BIT SET YET
;          6611         then
;          6612             begin                         !IT'S SET
;          6613             ERR_FLG = ZERO;               !THE BIT IS NOT IN ERROR SO CLEAR THE ERROR FLAG
;          6614             exitloop;                     !EXIT THE LOOP
;          6615             end;
;          6616
;          6617         end
;          6618     until .NED;                           !REPEAT SAMPLING UNS UNTIL NED IS SET
;          6619
;          6620     if .ERR_FLG                           !IS THE UNS BIT IN ERROR
;          6621     then
;          6622         begin                             !THE BIT IS IN ERROR
;          6623         ERRDF (151, ASYNC, DUMPER);       !REPORT THE ERROR TO THE OPERATOR
;          6624         PRINTB (ONE_FMT, UNS_ERR);        !TELL WHAT THE ERROR IS
;          6625         end;
;          6626
;          6627 !
;          6628 !
;          6629 ! NOW TELL THE OPERATOR TO TURN
;          6630 ! THE BOX POWER BACK ON.  ONCE THE
;          6631 ! DRIVE IS READY TEST THE VV BIT AND
;          6632 ! SEE IF THE POWER UP WITH BAD BATTERY
;          6633 ! BACK-UP CLEAR THE VV BIT, CLEARED
;          6634 ! MEMORY AND CLEARED THE DRIVE REGISTERS.
;          6635 !
;          6636 !
;          6637     PRINTB (ONE_FMT, PWR_ON);             !TELL THE OPERATOR TO TURN BOX POWER BACK ON
;          6638
;          6639     do                                    !DO NOTHING
;          6640         begin
;          6641         BREAK;                            !LOOK FOR CONTROL C
;          6642         end
;          6643     until .DRY;                           !UNTIL THE DRIVE IS READY
;          6644
;          6645     if .VV                                !DID THE POWER FAIL WITH BAD BAT BACK-UP CLEAR THE VV BIT
;          6646     then
```

```
13597 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
13598 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
13599 ;
13600 ;          6647          begin                            !THE VV BIT DIDN'T GET CLEARED
13601 ;          6648          ERRDF (152, ASYNC, DUMPER);      !REPORT THE ERROR TO THE OPERATOR
13602 ;          6649          PRINTB (ONE_FMT, VV_SET);        !TELL WHAT THE ERROR IS
13603 ;          6650          end;
13604 ;          6651
13605 ;          6652      incr REG_SEL from 0 to 6 do          !SEE IF DC LO ON POWER UP CLEARED THE REGISTERS
13606 ;          6653          begin
13607 ;          6654
13608 ;          6655          selectone .REG_SEL of            !SELECT THIS REGISTERS INDEX VALUE
13609 ;          6656              set
13610 ;          6657
13611 ;          6658              [0] :
13612 ;          6659                  index = 0;               !TEST MLCS1
13613 ;          6660
13614 ;          6661              [1] :
13615 ;          6662                  index = 6;               !TEST MLER
13616 ;          6663
13617 ;          6664              [2] :
13618 ;          6665                  index = 3;               !TEST MLDA
13619 ;          6666
13620 ;          6667              [3] :
13621 ;          6668                  index = 10;              !TEST MLMR
13622 ;          6669
13623 ;          6670              [4] :
13624 ;          6671                  index = 13;              !TEST MLE1
13625 ;          6672
13626 ;          6673              [5] :
13627 ;          6674                  index = 14;              !TEST MLE2
13628 ;          6675
13629 ;          6676              [6] :
13630 ;          6677                  index = 8;               !TEST MLPA
13631 ;          6678              tes;
13632 ;          6679
13633 ;          6680          CLR_DATA = (.HI) or (.IGNORE);   !GENERATE THIS REGISTERS CLEARED DATA
13634 ;          6681          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);  !READ THE REG FOR ITS CLEARD DATA
13635 ;          6682
13636 ;          6683          if .ERR_FLG                      !DID THE REGISTER GET CLEARED ON POWER UP
13637 ;          6684          then
13638 ;          6685              begin                        !THE REGISTER'S NOT CLEARED
13639 ;          6686              ERRDF (153, ASYNC, DUMPER);  !REPORT THE ERROR TO THE OPERATOR
13640 ;          6687              PRINTB (ONE_FMT, MB_DIS_ERR);!TELL WHAT THE ERROR IS
13641 ;          6688              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
13642 ;          6689              exitloop;                    !EXIT THE LOOP
13643 ;          6690              end;
13644 ;          6691
13645 ;          6692          end;
13646 ;          6693
13647 ;          6694      WCE_CNT = ZERO;                      !CLEAR THE WRITE CHECK ERROR COUNTER
13648 ;          6695      DSA_CNT = -1;                        !RESET THE DSA COUNTER
13649 ;          6696      IO_BUF = ZEROES;                     !LOAD THE FIRST IO_BUF WORD WITH ZEROES DATA
13650 ;          6697
13651 ;          6698      do                                   !SEARCH ALL OF MEMORY FOR INIT'ED DATA
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
;
;          6699          begin
;          6700          BREAK;                                 !LOOK FOR CONTROL C
;          6701          DSA_CNT = .DSA_CNT + 1;                !UP THE DSA COUNT
;          6702          WRT_CHK_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);   !WRITE CHECK THIS BLOCK
;          6703
;          6704          if .WCE then WCE_CNT = .WCE_CNT + 1;   !IS THIS BLOCK INIT'ED UP COUNT IF NOT
;          6705
;          6706          end
;          6707      !
;          6708      !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;          6709      !
;          6710          until .DSA_CNT eqlU .LST_BLK;          !CONTINUE WRITE CHECKING UNTIL THE LAST BLOCK IS DONE
;          6711
;          6712          if .WCE_CNT gtr 127                    !WAS THERE MORE THAN 127 SECTORS IN ERROR
;          6713          then
;          6714              begin                              !MORE THAN 127 SECTORS IN ERROR THERE FOR INIT ERROR
;          6715              ERRDF (65, ASYNC, DUMPER);         !REPORT THE ERROR TO THE OPERATOR
;          6716              PRINTB (ONE_FMT, NO_INIT);         !TELL WHAT THE ERROR IS
;          6717              end;
;          6718
;          6719          ENDSUB;                                !END SCOOP LOOP
;          6720          end;
;          6721
;          6722      ENDTST;                                    !END THE TEST
;
                                          .SBTTL  $T21 TEST CODE SECTION
13688 047444  004167  135142      $T21:   JSR     R1,$SAVE5                       ;                       6437
13689 047450  162706  000012              SUB     #12,SP
13690 047454  032767  000001  132726      BIT     #1,INTERVEN                     ;                       6484
13691 047462  001002                      BNE     1$
13692 047464  000167  001500              JMP     30$
13693 047470  012746  004716      1$:     MOV     #T.21,-(SP)                     ;                       6492
13694 047474  012746  010240              MOV     #ONE.FMT,-(SP)
13695 047500  012746  000002              MOV     #2,-(SP)
13696 047504  010600                      MOV     SP,R0                           ; SP,*
13697 047506  104414                      TRAP    14
13698 047510  104402              2$:     TRAP    2
13699 047512  152777  000040  145724      BISB    #40,@ML.REG+40                  ;                       6493
13700 047520  016705  146306              MOV     ML.DUT,R5
13701 047524  042705  177770              BIC     #177770,R5
13702 047530  142777  000007  145706      BICB    #7,@ML.REG+40
13703 047536  150577  145702              BISB    R5,@ML.REG+40
13704 047542  132777  000100  145704      BITB    #100,@ML.REG+50                 ;                       6507
13705 047550  001426                      BEQ     3$                                                      6510
13706 047552  012777  000021  145624      MOV     #21,@ML.REG                     ;                       6512
13707 047560  132777  000100  145666      BITB    #100,@ML.REG+50                 ;
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

047566  001046                                  BNE     4$
047570  104455                                  TRAP    55                              ;                                       6515
047572  000225                                  .WORD   225
047574  012706                                  .WORD   ASYNC
047576  026302                                  .WORD   DUMPER
047600  012746  005414                          MOV     #VV.CLEAR,-(SP)                 ;                                       6516
047604  012746  010240                          MOV     #ONE.FMT,-(SP)
047610  012746  000002                          MOV     #2,-(SP)
047614  010600                                  MOV     SP,R0                           ; SP,*
047616  104414                                  TRAP    14
047620  062706  000006                          ADD     #6,SP                           ;                                       6514
047624  000427                                  BR      4$                              ;                                       6507
047626  012777  000021  145550  3$:             MOV     #21,@ML.REG                     ;                                       6522
047634  132777  000100  145612                  BITB    #100,@ML.REG+50                 ;                                       6524
047642  001020                                  BNE     4$
047644  104455                                  TRAP    55                              ;                                       6527
047646  000226                                  .WORD   226
047650  012706                                  .WORD   ASYNC
047652  026302                                  .WORD   DUMPER
047654  012746  012302                          MOV     #FNC.11,-(SP)                   ;                                       6528
047660  012746  005340                          MOV     #VV.NOT.SET,-(SP)
047664  012746  010246                          MOV     #TWO.FMT,-(SP)
047670  012746  000003                          MOV     #3,-(SP)
047674  010600                                  MOV     SP,R0                           ; SP,*
047676  104414                                  TRAP    14
047700  062706  000010                          ADD     #10,SP                          ;                                       6526
047704  132777  000001  145472  4$:             BITB    #1,@ML.REG                      ;                                       6541
047712  001426                                  BEQ     5$
047714  104455                                  TRAP    55                              ;                                       6544
047716  000076                                  .WORD   76
047720  012706                                  .WORD   ASYNC
047722  026302                                  .WORD   DUMPER
047724  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       6545
047730  012746  012302                          MOV     #FNC.11,-(SP)
047734  012746  010640                          MOV     #WRD.11,-(SP)
047740  012746  011626                          MOV     #PHR.2,-(SP)
047744  012746  010520                          MOV     #WRD.1,-(SP)
047750  012746  010304                          MOV     #FIV.FMT,-(SP)
047754  012746  000006                          MOV     #6,-(SP)
047760  010600                                  MOV     SP,R0                           ; SP,*
047762  104414                                  TRAP    14
047764  062706  000016                          ADD     #16,SP                          ;                                       6543
047770  132777  000001  145466  5$:             BITB    #1,@ML.REG+60                   ;                                       6548
047776  001426                                  BEQ     6$
050000  104455                                  TRAP    55                              ;                                       6551
050002  000077                                  .WORD   77
050004  012706                                  .WORD   ASYNC
050006  026302                                  .WORD   DUMPER
050010  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       6552
050014  012746  012302                          MOV     #FNC.11,-(SP)
050020  012746  010640                          MOV     #WRD.11,-(SP)
050024  012746  011714                          MOV     #PHR.5,-(SP)
```

```
13765                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
13766                                   ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
13767
13768 050030  012746  010536                    MOV     #WRD.3,-(SP)
13769 050034  012746  010304                    MOV     #FIV.FMT,-(SP)
13770 050040  012746  000006                    MOV     #6,-(SP)
13771 050044  010600                            MOV     SP,R0                   ; SP,*
13772 050046  104414                            TRAP    14
13773 050050  062706  000016                    ADD     #16,SP                  ;                                       6550
13774 050054  032777  020000  145402  6$:       BIT     #20000,@ML.REG+60       ;                                       6555
13775 050062  001426                            BEQ     7$
13776 050064  104455                            TRAP    55                      ;                                       6558
13777 050066  000100                            .WORD   100
13778 050070  012706                            .WORD   ASYNC
13779 050072  026302                            .WORD   DUMPER
13780 050074  012746  010730                    MOV     #WRD.19,-(SP)           ;                                       6559
13781 050100  012746  012302                    MOV     #FNC.11,-(SP)
13782 050104  012746  010640                    MOV     #WRD.11,-(SP)
13783 050110  012746  011714                    MOV     #PHR.5,-(SP)
13784 050114  012746  010544                    MOV     #WRD.4,-(SP)
13785 050120  012746  010304                    MOV     #FIV.FMT,-(SP)
13786 050124  012746  000006                    MOV     #6,-(SP)
13787 050130  010600                            MOV     SP,R0                   ; SP,*
13788 050132  104414                            TRAP    14
13789 050134  062706  000016                    ADD     #16,SP                  ;                                       6557
13790 050140  104467                  7$:       TRAP    67                      ;                                       6560
13791 050142  006000                            ROR     R0
13792 050144  103002                            BHIS    8$
13793 050146  000167  177336                    JMP     2$
13794 050152  104402                  8$:       TRAP    2                       ;                                       6562
13795 050154  012767  177777  143640            MOV     #-1,IO.BUF              ;                                       6573
13796 050162  012703  177777                    MOV     #-1,R3                  ; *,DSA.CNT                             6574
13797 050166  104422                  9$:       TRAP    22                      ;                                       6585
13798 050170  005203                            INC     R3                      ; DSA.CNT                               6587
13799 050172  012766  177400  000006            MOV     #-400,6(SP)             ; *,SIZE                                6588
13800 050200  012746  177400                    MOV     #-400,-(SP)
13801 050204  010366  000016                    MOV     R3,16(SP)               ; DSA.CNT,DST
13802 050210  010346                            MOV     R3,-(SP)                ; DSA.CNT,*
13803 050212  012701  014022                    MOV     #IO.BUF,R1              ; *,SRC
13804 050216  010146                            MOV     R1,-(SP)                ; SRC,*
13805 050220  004767  157202                    JSR     PC,WRT.TRANSFER
13806 050224  062706  000006                    ADD     #6,SP                   ;                                       6585
13807 050230  020367  143560                    CMP     R3,LST.BLK              ; DSA.CNT,*                             6593
13808 050234  001354                            BNE     9$
13809 050236  012766  000001  000016            MOV     #1,16(SP)               ; *,ERR.FLG                             6595
13810 050244  152777  000040  145172            BISB    #40,@ML.REG+40
13811 050252  016705  145554                    MOV     ML.DUT,R5
13812 050256  042705  177770                    BIC     #177770,R5
13813 050262  142777  000007  145154            BICB    #7,@ML.REG+40
13814 050270  150577  145150                    BISB    R5,@ML.REG+40
13815 050274  012746  005112                    MOV     #PWR.OFF,-(SP)          ;                                       6604
13816 050300  012746  010240                    MOV     #ONE.FMT,-(SP)
13817 050304  012746  000002                    MOV     #2,-(SP)
13818 050310  010600                            MOV     SP,R0                   ; SP,*
13819 050312  104414                            TRAP    14
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

050314  104422                          10$:    TRAP    22                      ;                                       6607
050316  032777  040000  145140                  BIT     #40000,@ML.REG+60       ;                                       6610
050324  001403                                  BEQ     11$
050326  005066  000024                          CLR     24(SP)                  ; ERR.FLG                               6613
050332  000404                                  BR      12$                     ;                                       6614
050334  032777  010000  145102          11$:    BIT     #10000,@ML.REG+40       ;                                       6618
050342  001764                                  BEQ     10$
050344  032766  000001  000024          12$:    BIT     #1,24(SP)               ; *,ERR.FLG                             6620
050352  001416                                  BEQ     13$
050354  104455                                  TRAP    55                      ;                                       6623
050356  000227                                  .WORD   227
050360  012706                                  .WORD   ASYNC
050362  026302                                  .WORD   DUMPER
050364  012746  005272                          MOV     #UNS.ERR,-(SP)          ;                                       6624
050370  012746  010240                          MOV     #ONE.FMT,-(SP)
050374  012746  000002                          MOV     #2,-(SP)
050400  010600                                  MOV     SP,R0                   ; SP,*
050402  104414                                  TRAP    14
050404  062706  000006                          ADD     #6,SP                   ;                                       6622
050410  012716  005202                  13$:    MOV     #PWR.ON,(SP)            ;                                       6637
050414  012746  010240                          MOV     #ONE.FMT,-(SP)
050420  012746  000002                          MOV     #2,-(SP)
050424  010600                                  MOV     SP,R0                   ; SP,*
050426  104414                                  TRAP    14
050430  104422                          14$:    TRAP    22                      ;                                       6640
050432  105777  145016                          TSTB    @ML.REG+50              ;                                       6643
050436  100374                                  BPL     14$
050440  132777  000100  145006                  BITB    #100,@ML.REG+50         ;                                       6645
050446  001416                                  BEQ     15$
050450  104455                                  TRAP    55                      ;                                       6648
050452  000230                                  .WORD   230
050454  012706                                  .WORD   ASYNC
050456  026302                                  .WORD   DUMPER
050460  012746  005764                          MOV     #VV.SET,-(SP)           ;                                       6649
050464  012746  010240                          MOV     #ONE.FMT,-(SP)
050470  012746  000002                          MOV     #2,-(SP)
050474  010600                                  MOV     SP,R0                   ; SP,*
050476  104414                                  TRAP    14
050500  062706  000006                          ADD     #6,SP                   ;                                       6647
050504  005005                          15$:    CLR     R5                      ; REG.SEL                               6652
050506  005705                          16$:    TST     R5                      ; REG.SEL                               6655
050510  001002                                  BNE     17$
050512  005002                                  CLR     R2                      ; INDEX                                 6659
050514  000443                                  BR      23$                     ;                                       6655
050516  020527  000001                  17$:    CMP     R5,#1                   ; REG.SEL,*
050522  001003                                  BNE     18$
050524  012702  000006                          MOV     #6,R2                   ; *,INDEX                               6662
050530  000435                                  BR      23$                     ;                                       6655
050532  020527  000002                  18$:    CMP     R5,#2                   ; REG.SEL,*
050536  001003                                  BNE     19$
050540  012702  000003                          MOV     #3,R2                   ; *,INDEX                               6665
050544  000427                                  BR      23$                     ;                                       6655
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

050546  020527  000003          19$:    CMP     R5,#3                   ; REG.SEL,*
050552  001003                          BNE     20$
050554  012702  000012                  MOV     #12,R2                  ; *,INDEX                                       6668
050560  000421                          BR      23$                     ;                                               6655
050562  020527  000004          20$:    CMP     R5,#4                   ; REG.SEL,*
050566  001003                          BNE     21$
050570  012702  000015                  MOV     #15,R2                  ; *,INDEX                                       6671
050574  000413                          BR      23$                     ;                                               6655
050576  020527  000005          21$:    CMP     R5,#5                   ; REG.SEL,*
050602  001003                          BNE     22$
050604  012702  000016                  MOV     #16,R2                  ; *,INDEX                                       6674
050610  000405                          BR      23$                     ;                                               6655
050612  020527  000006          22$:    CMP     R5,#6                   ; REG.SEL,*
050616  001002                          BNE     23$
050620  012702  000010                  MOV     #10,R2                  ; *,INDEX                                       6677
050624  010200                  23$:    MOV     R2,R0                   ; INDEX,*                                       6680
050626  006300                          ASL     R0
050630  006300                          ASL     R0
050632  006300                          ASL     R0
050634  010004                          MOV     R0,R4
050636  016400  015406                  MOV     ML.REG+2(R4),R0
050642  056400  015412                  BIS     ML.REG+6(R4),R0
050646  010066  000024                  MOV     R0,24(SP)               ; *,CLR.DATA
050652  010046                          MOV     R0,-(SP)                ; CLR.DATA,*                                    6681
050654  010546                          MOV     R5,-(SP)                ; REG.SEL,*
050656  012746  000036                  MOV     #36,-(SP)
050662  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
050664  004767  155022                  JSR     PC,RD.REG
050670  032766  000001  000036          BIT     #1,36(SP)               ; *,ERR.FLG                                     6683
050676  001433                          BEQ     24$
050700  104455                          TRAP    55                      ;                                               6686
050702  000231                          .WORD   231
050704  012706                          .WORD   ASYNC
050706  026302                          .WORD   DUMPER
050710  012746  005570                  MOV     #MB.DIS.ERR,-(SP)       ;                                               6687
050714  012746  010240                  MOV     #ONE.FMT,-(SP)
050720  012746  000002                  MOV     #2,-(SP)
050724  010600                          MOV     SP,R0                   ; SP,*
050726  104414                          TRAP    14
050730  016716  144416                  MOV     RD.DATA,(SP)            ;                                               6688
050734  016646  000040                  MOV     40(SP),-(SP)            ; CLR.DATA,*
050740  016446  015404                  MOV     ML.REG(R4),-(SP)
050744  012746  007436                  MOV     #FMT.16,-(SP)
050750  012746  000004                  MOV     #4,-(SP)
050754  010600                          MOV     SP,R0                   ; SP,*
050756  104414                          TRAP    14
050760  062706  000024                  ADD     #24,SP                  ;                                               6689
050764  000406                          BR      25$
050766  062706  000006          24$:    ADD     #6,SP                   ;                                               6653
050772  005205                          INC     R5                      ; REG.SEL                                       6652
050774  020527  000006                  CMP     R5,#6                   ; REG.SEL,*
051000  003642                          BLE     16$
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

 051002  005066  000022                 25$:    CLR     22(SP)                  ; WCE.CNT                                6694
 051006  012703  177777                         MOV     #-1,R3                  ; *,DSA.CNT                              6695
 051012  005067  143004                         CLR     IO.BUF                  ;                                        6696
 051016  104422                         26$:    TRAP    22                      ;                                        6699
 051020  005203                                 INC     R3                      ; DSA.CNT                                6701
 051022  012766  177400  000020                 MOV     #-400,20(SP)            ; *,SIZE                                 6702
 051030  012746  177400                         MOV     #-400,-(SP)
 051034  010366  000030                         MOV     R3,30(SP)               ; DSA.CNT,DST
 051040  010346                                 MOV     R3,-(SP)                ; DSA.CNT,*
 051042  012701  014022                         MOV     #IO.BUF,R1              ; *,SRC
 051046  010146                                 MOV     R1,-(SP)                ; SRC,*
 051050  004767  156102                         JSR     PC,WRT.CHK.TRANSFE
 051054  032777  040000  144362                 BIT     #40000,@ML.REG+40       ;                                        6704
 051062  001402                                 BEQ     27$
 051064  005266  000030                         INC     30(SP)                  ; WCE.CNT
 051070  062706  000006                 27$:    ADD     #6,SP                   ;                                        6699
 051074  020367  142714                         CMP     R3,LST.BLK              ; DSA.CNT,*                              6710
 051100  001346                                 BNE     26$
 051102  026627  000022  000177                 CMP     22(SP),#177             ; WCE.CNT,*                              6712
 051110  003416                                 BLE     28$
 051112  104455                                 TRAP    55                      ;                                        6715
 051114  000101                                 .WORD   101
 051116  012706                                 .WORD   ASYNC
 051120  026302                                 .WORD   DUMPER
 051122  012746  005470                         MOV     #NO.INIT,-(SP)          ;                                        6716
 051126  012746  010240                         MOV     #ONE.FMT,-(SP)
 051132  012746  000002                         MOV     #2,-(SP)
 051136  010600                                 MOV     SP,R0                   ; SP,*
 051140  104414                                 TRAP    14
 051142  062706  000006                         ADD     #6,SP                   ;                                        6714
 051146  062706  000012                 28$:    ADD     #12,SP                  ;                                        6562
 051152  104467                                 TRAP    67                      ;                                        6717
 051154  006000                                 ROR     R0
 051156  103002                                 BHIS    29$
 051160  000167  176766                         JMP     8$
 051164  062706  000006                 29$:    ADD     #6,SP                   ;                                        6486
 051170  062706  000012                 30$:    ADD     #12,SP                  ;                                        6437
 051174  000207                                 RTS     PC

                                        ; Routine Size:  429 words
                                        ; Maximum stack depth per invocation:  29 words



                                                .SBTTL  T21 TEST CODE SECTION
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<

                                        T21::
051176                                  1$:     JSR     PC,$T21                 ;                               6720
051176  004767  176242                        TRAP    66
051202  104466                                ROR     R0
051204  006000                                BLO     1$
051206  103773                                RTS     PC
051210  000207

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;       6723  !<BLF/PAGE>
```

```
14012 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V4(212)
14013 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (74)
14014 ;
14015 ;          6724   !
14016 ;          6725   !
14017 ;          6726   BGNTST;
14018 ;          6727
14019 ;          6728   !++
14020 ;          6729   ! TEST NUMBER:  TST 22
14021 ;          6730   !
14022 ;          6731   ! TEST NAME:    ILLEGAL FUNCTION TEST
14023 ;          6732   !
14024 ;          6733   ! TEST DESCRIPTION:
14025 ;          6734   !
14026 ;          6735   !       TEST THE DETECTION OF ILLEGAL
14027 ;          6736   !       FUNCTIONS WRITTEN TO MLCS1
14028 ;          6737   !       BY:
14029 ;          6738   !
14030 ;          6739   !       WRITING ALL POSSIBLE ILLEGAL
14031 ;          6740   !       FUNCTIONS TO MLCS1.  THEN
14032 ;          6741   !       TEST GO AND ERROR BITS CLEARED.
14033 ;          6742   !
14034 ;          6743   !--
14035 ;          6744
14036 ;          6745   local
14037 ;          6746       BAD_BITS,                            !STORES A COUNT TO GENERATE BAD FUNCTIONS
14038 ;          6747       BAD_FUNC;                            !STORES GENERATED BAD FUNCTION
14039 ;          6748
14040 ;          6749   CLR_THRESHOLD;                           !CLEAR ERROR PRINT THRESHOLD
14041 ;          6750   BAD_BITS = ZEROES;                       !CLEAR BAD BITS
14042 ;          6751
14043 ;          6752   incr CNT_1 from 0 to 2 do                !REPEAT LOOP 3 TIMES
14044 ;          6753       begin
14045 ;          6754       BAD_BITS = .BAD_BITS + %o'2';        !ADD 2 TO BAD_BITS
14046 ;          6755
14047 ;          6756       incr CNT_2 from %o'1' to %o'71' by %o'10' do        !REPEAT LOOP GENERATING 'GOOD' FUNCTIONS
14048 ;          6757           begin
14049 ;          6758           BGNSUB;
14050 ;          6759           CLR_MBUS;
14051 ;          6760           BAD_FUNC = .CNT_2 + .BAD_BITS;   !ADD BAD_BITS TO CNT_2 GENERATING BAD FUNCTIONS
14052 ;          6761           FIRST_BLK_XFER 7);               !SET UP A FIRST BLOCK XFERR
14053 ;          6762           MLCS1 = .BAD_FUNC;               !LOAD MLCS1 WITH TWO BAD FUNCTIONS
14054 ;          6763
14055 ;          6764           if .ILF IS_SET                   !SEE IF ILF IS SET
14056 ;          6765           then
14057 ;          6766               begin
14058 ;          6767
14059 ;          6768               if .GO IS_SET                !IF ILF IS SET THEN SEE IF GO IS SET
14060 ;          6769               then
14061 ;          6770                   begin
14062 ;          6771                   CMP_THRESHOLD;           !COMPARE ERROR PRINT THRESHOLD
14063 ;          6772                   ERRDF (66, ASYNC, DUMPER);   !ERROR IF GO SET WITH BAD FUNCTION
14064 ;          6773                   PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_12, WRD_19);
14065 ;          6774                   PRINTB (FMT_12, .BAD_FUNC);
14066 ;          6775                   end;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (74)

;                        end
;                    else
;                        begin
;                        CMP_THRESHOLD;                         !COMPARE ERROR PRINT THRESHOLD
;                        ERRDF (67, ASYNC, DUMPER);             !ERROR BAD FUNCTION DON'T CAUSE ILF
;                        PRINTB (FIV_FMT, WRD_3, PHR_1, WRD_11, FNC_12, WRD_19);
;                        PRINTB (FMT_12, .BAD_FUNC);
;                        end;

;                    if .OPI IS_SET                             !SEE IF OPI IS SET
;                    then
;                        begin
;                        CMP_THRESHOLD;                         !COMPARE ERROR PRINT THRESHOLD
;                        ERRDF (68, ASYNC, DUMPER);             !ERROR IF SET
;                        PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_12, WRD_19);
;                        PRINTB (FMT_12, .BAD_FUNC);
;                        end;

;                    ENDSUB;
;                    end;

;                end;

;            ENDTST;

                                        .SBTTL  $T22 TEST CODE SECTION
051212  004167  133374          $T22:   JSR     R1,$SAVE5                       ;                                   6722
051216  005067  144154                  CLR     P.CNT                           ;                                   6747
051222  005004                          CLR                                     ; BAD.BITS                          6750
051224  005001                          CLR                                     ; CNT.1                             6752
051226  062704  000002          1$:     ADD                                     ; *,BAD.BITS                        6754
051232  012702  000001                  MOV     #[illegible]2                   ; *,CNT.2                           6756
051236  010405                  2$:     MOV     R4,R5                           ; BAD.BITS,*                        6760
051240  060205                          ADD     R2,R5                           ; CNT.2,*
051242  104402                  3$:     TRAP    2                               ;                                   6757
051244  152777  000040  144172          BISB    #40,@ML.REG+40                  ;                                   6758
051252  016700  144554                  MOV     ML.DUT,R0
051256  042700  177770                  BIC     #177770,R0
051262  142777  000007  144154          BICB    #7,@ML.REG+40
051270  150077  144150                  BISB    R0,@ML.REG+40
051274  010503                          MOV     R5,R3                           ; *,BAD.FUNC                        6760
051276  004767  146760                  JSR     PC,FIRST.BLK.XFER               ;                                   6761
051302  010377  144076                  MOV     R3,@ML.REG                      ; BAD.FUNC,*                        6762
051306  132777  000001  144150          BITB    #1,@ML.REG+60                   ;                                   6764
051314  001446                          BEQ     4$
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

051316  132777  000001  144060          BITB    #1,@ML.REG                      ;                                       6768
051324  001505                          BEQ     6$
051326  005267  144044                  INC     P.CNT                           ;                                       6770
051332  026767  144040  144040          CMP     P.CNT,LIMIT
051340  003153                          BGT     8$
051342  104455                          TRAP    55                              ;                                       6772
051344  000102                          .WORD   102
051346  012706                          .WORD   ASYNC
051350  026302                          .WORD   DUMPER
051352  012746  010730                  MOV     #WRD.19,-(SP)                   ;                                       6773
051356  012746  012322                  MOV     #FNC.12,-(SP)
051362  012746  010640                  MOV     #WRD.11,-(SP)
051366  012746  011626                  MOV     #PHR.2,-(SP)
051372  012746  010520                  MOV     #WRD.1,-(SP)
051376  012746  010304                  MOV     #FIV.FMT,-(SP)
051402  012746  000006                  MOV     #6,-(SP)
051406  010600                          MOV     SP,R0                           ; SP,*
051410  104414                          TRAP    14
051412  010316                          MOV     R3,(SP)                         ; BAD.FUNC,*                            6774
051414  012746  007224                  MOV     #FMT.12,-(SP)
051420  012746  000002                  MOV     #2,-(SP)
051424  010600                          MOV     SP,R0                           ; SP,*
051426  104414                          TRAP    14
051430  001441                          BR      5$                              ;                                       6770
051432  005267  143740          4$:     INC     P.CNT                           ;                                       6779
051436  026767  143734  143734          CMP     P.CNT,LIMIT
051444  003111                          BGT     8$
051446  104455                          TRAP    55                              ;                                       6781
051450  000103                          .WORD   103
051452  012706                          .WORD   ASYNC
051454  026302                          .WORD   DUMPER
051456  012746  010730                  MOV     #WRD.19,-(SP)                   ;                                       6782
051462  012746  012322                  MOV     #FNC.12,-(SP)
051466  012746  010640                  MOV     #WRD.11,-(SP)
051472  012746  011610                  MOV     #PHR.1,-(SP)
051476  012746  010536                  MOV     #WRD.3,-(SP)
051502  012746  010304                  MOV     #FIV.FMT,-(SP)
051506  012746  000006                  MOV     #6,-(SP)
051512  010600                          MOV     SP,R0                           ; SP,*
051514  104414                          TRAP    14
051516  010316                          MOV     R3,(SP)                         ; BAD.FUNC,*                            6783
051520  012746  007224                  MOV     #FMT.12,-(SP)
051524  012746  000002                  MOV     #2,-(SP)
051530  010600                          MOV     SP,R0                           ; SP,*
051532  104414                          TRAP    14
051534  062706  000022          5$:     ADD     #22,SP                          ;                                       6779
051540  032777  020000  143716  6$:     BIT     #20000,@ML.REG+60               ;                                       6786
051546  001443                          BEQ     7$
051550  005267  143622                  INC     P.CNT                           ;                                       6788
051554  026767  143616  143616          CMP     P.CNT,LIMIT
051562  003042                          BGT     8$
051564  104455                          TRAP    55                              ;                                       6790
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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

051566  000104                                  .WORD   104
051570  012706                                  .WORD   ASYNC
051572  026302                                  .WORD   DUMPER
051574  012746  010730                          MOV     #WRD.19,-(SP)                   ;                                       6791
051600  012746  012322                          MOV     #FNC.12,-(SP)
051604  012746  010650                          MOV     #WRD.12,-(SP)
051610  012746  011714                          MOV     #PHR.5,-(SP)
051614  012746  010544                          MOV     #WRD.4,-(SP)
051620  012746  010304                          MOV     #FIV.FMT,-(SP)
051624  012746  000006                          MOV     #6,-(SP)
051630  010600                                  MOV     SP,R0                           ; SP,*
051632  104414                                  TRAP    14
051634  010316                                  MOV     R3,(SP)                         ; BAD.FUNC,*                            6792
051636  012746  007224                          MOV     #FMT.12,-(SP)
051642  012746  000002                          MOV     #2,-(SP)
051646  010600                                  MOV     SP,R0                           ; SP,*
051650  104414                                  TRAP    14
051652  062706  000022                          ADD     #22,SP                          ;                                       6788
051656  104467                          7$:     TRAP    67                              ;                                       6793
051660  006000                                  ROR     R0
051662  103002                                  BHIS    8$
051664  000167  177352                          JMP     3$
051670  062702  000010                  8$:     ADD     #10,R2                          ; *,CNT.2                               6756
051674  020227  000071                          CMP     R2,#71                          ; CNT.2,*
051700  003002                                  BGT     9$
051702  000167  177330                          JMP     2$
051706  005201                          9$:     INC     R1                              ; CNT.1                                 6752
051710  020127  000002                          CMP     R1,#2                           ; CNT.1,*
051714  003002                                  BGT     10$
051716  000167  177304                          JMP     1$
051722  000207                          10$:    RTS     PC                              ;                                       6722

                                        ; Routine Size:  165 words
                                        ; Maximum stack depth per invocation:  15 words



                                                .SBTTL  T22 TEST CODE SECTION
051724                                  T22::
051724  004767  177262                  1$:     JSR     PC,$T22                         ;                                       6798
051730  104466                                  TRAP    66
051732  006000                                  ROR     R0
```

```
14236                                   ;ML4AD
14237                                   ;               TEST CODE SECTION
14238
14239 051734  103773                              BLO     1$
14240 051736  000207                              RTS     PC
14241
14242                                   ; Routine Size:  6 words
14243                                   ; Maximum stack depth per invocation:  0 words
14248
14249
14250 ;          6801   !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (75)

;          6802  !
;          6803  !
;          6804  BGNTST;
;          6805
;          6806  !++
;          6807  ! TEST NUMBER:  TST 23
;          6808  !
;          6809  ! TEST NAME:    REGISTER MODIFICATION REFUSED TEST
;          6810  !
;          6811  ! TEST DESCRIPTION:
;          6812  !
;          6813  !       TEST THE DETECTION OF A
;          6814  !       REGISTER MODIFICATION REFUSED
;          6815  !       BY:
;          6816  !
;          6817  !       1.  WRITTING TO MLCS1, MLDA
;          6818  !           AND MLER WHILE THE DRIVE
;          6819  !           IS BUSY AND TEST RMR
;          6820  !           BIT SET.
;          6821  !
;          6822  !       ALSO SEE IF THE DRIVE ASSERTED
;          6823  !       EXCEPTION BY TESTING THE TRE BIT SET.
;          6824  !
;          6825  !--
;          6826
;          6827  incr CNT from 0 to 2 do                          !REPEAT LOOP 3 TIMES
;          6828      begin
;          6829      BGNSUB;
;          6830      CLR_MBUS;
;          6831      MLCS1 = write;                               !DO A WRITE FUNCTION
;          6832
;          6833      case .CNT from 0 to 2 of                     !WRITE TO SELECTED REGISTERS FORCING RMR
;          6834          set
;          6835
;          6836          [0] :
;          6837              MLCS1 = %o'000000';
;          6838
;          6839          [1] :
;          6840              MLDA = ONES;
;          6841
;          6842          [2] :
;          6843              MLER = ONES
;          6844          tes;
;          6845
;          6846      DELAY (FRTY_US);
;          6847
;          6848      if .RMR IS_NOT_SET                           !SEE IF RMR GOT SET
;          6849      then
;          6850          begin
;          6851          ERRDF (69, ASYNC, DUMPER);               !ERROR IF NOT SET
;          6852          PRINTB (FOR_FMT, WRD_21, PHR_1, WRD_11, WRD_21);
;          6853          end;
```

```
14308 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
14309 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (75)
14310 ;
14311 ;          6854
14312 ;          6855      if .TRE IS_NOT_SET                   !SEE IF DRIVE ASSERTED EXCEPTION BY TESTING TRE
14313 ;          6856      then
14314 ;          6857          begin
14315 ;          6858          ERRDF (117, SYNC, DUMPER);
14316 ;          6859          PRINTB (FOR_FMT, WRD_20, PHR_1, WRD_11, WRD_21);
14317 ;          6860          end;
14318 ;          6861
14319 ;          6862      ENDSUB;
14320 ;          6863      end;
14321 ;          6864
14322 ;          6865  ENDTST;
14326
14327                                          .SBTTL  $T23 TEST CODE SECTION
14331 051740  004167  132574          $T23:   JSR     R1,$SAVE2                ;                          6800
14332 051744  005746                          TST     -(SP)
14333 051746  005002                          CLR     R2                       ; CNT                      6827
14334 051750  104402                  1$:     TRAP    2                        ;                          6828
14335 051752  152777  000040  143464          BISB    #40,@ML.REG+40           ;                          6829
14336 051760  016701  144046                  MOV     ML.DUT,R1
14337 051764  042701  177770                  BIC     #177770,R1
14338 051770  142777  000007  143446          BICB    #7,@ML.REG+40
14339 051776  150177  143442                  BISB    R1,@ML.REG+40
14340 052002  012777  000061  143374          MOV     #61,@ML.REG              ;                          6831
14341 052010  010201                          MOV     R2,R1                    ; CNT,*                    6833
14342 052012  006301                          ASL     R1
14343 052014  066107  052020                  ADD     2$(R1),PC
14344 052020  000006                  2$:     .WORD   3$-2$
14345 052022  000014                          .WORD   4$-2$
14346 052024  000024                          .WORD   5$-2$
14347 052026  005077  143352          3$:     CLR     @ML.REG                  ;                          6837
14348 052032  000407                          BR      6$                       ;                          6833
14349 052034  012777  177777  143372  4$:     MOV     #-1,@ML.REG+30           ;                          6840
14350 052042  000403                          BR      6$                       ;                          6833
14351 052044  012777  177777  143412  5$:     MOV     #-1,@ML.REG+60           ;                          6843
14352 052052  012700  000050          6$:     MOV     #50,R0                   ; *,$$TMP2                 6846
14353 052056  001410                  7$:     BEQ     10$
14354 052060  016701  130032                  MOV     L$DLY,R1                 ; *,$$TMP1
14355 052064  001403                          BEQ     9$
14356 052066  005016                  8$:     CLR     (SP)                     ; $$TMP
14357 052070  005301                          DEC     R1                       ; $$TMP1
14358 052072  001375                          BNE     8$
14359 052074  005300                  9$:     DEC     R0                       ; $$TMP2
14360 052076  000767                          BR      7$
14361 052100  132777  000004  143356  10$:    BITB    #4,@ML.REG+60            ;                          6848
14362 052106  001024                          BNE     11$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

052110  104455                                  TRAP    55                      ;                                       6851
052112  000105                                  .WORD   105
052114  012706                                  .WORD   ASYNC
052116  026302                                  .WORD   DUMPER
052120  012746  010744                          MOV     #WRD.21,-(SP)           ;                                       6852
052124  012746  010640                          MOV     #WRD.11,-(SP)
052130  012746  011610                          MOV     #PHR.1,-(SP)
052134  012746  010744                          MOV     #WRD.21,-(SP)
052140  012746  010270                          MOV     #FOR.FMT,-(SP)
052144  012746  000005                          MOV     #5,-(SP)
052150  010600                                  MOV     SP,R0                   ; SP,*
052152  104414                                  TRAP    14
052154  062706  000014                          ADD     #14,SP                  ;                                       6850
052160  032777  040000  143216  11$:            BIT     #40000,@ML.REG          ;                                       6855
052166  001024                                  BNE     12$
052170  104455                                  TRAP    55                      ;                                       6858
052172  000165                                  .WORD   165
052174  012750                                  .WORD   SYNC
052176  026302                                  .WORD   DUMPER
052200  012746  010744                          MOV     #WRD.21,-(SP)           ;                                       6859
052204  012746  010640                          MOV     #WRD.11,-(SP)
052210  012746  011610                          MOV     #PHR.1,-(SP)
052214  012746  010736                          MOV     #WRD.20,-(SP)
052220  012746  010270                          MOV     #FOR.FMT,-(SP)
052224  012746  000005                          MOV     #5,-(SP)
052230  010600                                  MOV     SP,R0                   ; SP,*
052232  104414                                  TRAP    14
052234  062706  000014                          ADD     #14,SP                  ;                                       6857
052240  104467                  12$:            TRAP    67                      ;                                       6860
052242  006000                                  ROR     R0
052244  103641                                  BLO     1$
052246  005202                                  INC     R2                      ; CNT                                   6827
052250  020227  000002                          CMP     R2,#2                   ; CNT,*
052254  003635                                  BLE     1$
052256  005726                                  TST     (SP)+                   ;                                       6800
052260  000207                                  RTS     PC

                                        ; Routine Size:  105 words
                                        ; Maximum stack depth per invocation:  10 words



                                                .SBTTL  T23 TEST CODE SECTION
```

```
14424 052262
14425 052262  004767  177452          T23::
14426 052266  104466          1$:     JSR     PC,$T23                 ;       6863
14427 052270  006000                  TRAP    66
14428 052272  103773                  ROR     R0
14429 052274  000207                  BLO     1$
14430                                 RTS     PC
14431
14432                                 ; Routine Size:  6 words
14437                                 ; Maximum stack depth per invocation:  0 words
14438
14439 ;         6866  !<BLF/PAGE>
```

```
14441 ;ML4AD
14442 ;                 TEST CODE SECTION
14443 ;
14444 ;          6867   !
14445 ;          6868   !
14446 ;          6869   BGNTST;
14447 ;          6870
14448 ;          6871   !++
14449 ;          6872   ! TEST NUMBER:  TST 24
14450 ;          6873   !
14451 ;          6874   ! TEST NAME : initial PROM TEST
14452 ;          6875   !
14453 ;          6876   ! TEST DESCRIPTION:
14454 ;          6877   !
14455 ;          6878   !       TEST THE MEMORY ARRAYS' PROM
14456 ;          6879   !       TIMING AND CONTROL LOGIC FOR
14457 ;          6880   !       INITIAL PROM READS BY:
14458 ;          6881   !
14459 ;          6882   !       1.  READING 14 PROM LOCATIONS
14460 ;          6883   !           AND TESTING FOR:
14461 ;          6884   !
14462 ;          6885   !           A. CHECK SUM ERRORS AT
14463 ;          6886   !              EACH ROW COLUMN ADRS
14464 ;          6887   !
14465 ;          6888   !           B. SUM OF EACH PROM BIT SET
14466 ;          6889   !              <9,0> GTR 14.
14467 ;          6890   !
14468 ;          6891   !--
14469 ;          6892
14470 ;          6893   local
14471 ;          6894       OFF_SET_CNT : vector [10, byte],        !COUNTS EACH NIBBLE OFFSET
14472 ;          6895       ROW_ORED_COL : bitvector [16],          !SAVES ROW DATA OR'ED WITH COL DATA
14473 ;          6896       R_C_SAV : bitvector [16],               !TEMP LOCATION FOR ROW COL DATA
14474 ;          6897       PROM_ADRS,                              !PROM ADDRESS
14475 ;          6898       CHK_SUM,                                !CHECK SUM DATA
14476 ;          6899       CHK_SUM_ERR,                            !CHECK SUM ERROR
14477 ;          6900       BAD_NIB_CNT,                            !COUNTS BAD NIBBLES
14478 ;          6901       CNT_14_BAD,                             !COUNTS BAD NIBBLE POSITION EQL 14
14479 ;          6902       DODO_FLG,                               !DROP UNIT FLAG
14480 ;          6903       ERR_FLG;                                !ERROR FLAG
14481 ;          6904
14482 ;          6905   CLR_THRESHOLD;                              !CLEAR ERROR PRINT THRESHOLD
14483 ;          6906   CLR_MBUS;
14484 ;          6907   DODO_FLG = ZERO;
14485 ;          6908   PROM_DIS = ONE;                             !SET PROM DISABLE MODE
14486 ;          6909   CHK_SUM_ERR = ZEROES;
14487 ;          6910
14488 ;          6911   incr CNT from 0 to 9 do                     !CLEAR OFFSET COUNTS
14489 ;          6912       OFF_SET_CNT [.CNT] = ZEROES;
14490 ;          6913
14491 ;          6914   incr ADRS_CNT from 0 to 14 do               !READ PROM DATA FROM 15 ARRAY WORDS
14492 ;          6915       begin
14493 ;          6916       ROW_ORED_COL = ZEROES;                  !CLEAR ROW ORED COL SAVE LOCATION
14494 ;          6917       PROM_ADRS = .ADRS_CNT;                  !GET COPY OF ADRS_CNT
14495 ;          6918
```

```
14497 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
14498 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (76)
14499 ;
14500 ;          6919       incr TWICE from 0 to 1 do                !READ ROW AND COL DATA FOR THIS ARRAY WORD
14501 ;          6920           begin
14502 ;          6921           BAD_NIB_CNT = ZEROES;
14503 ;          6922           ERR_FLG = ZERO;
14504 ;          6923           MLPA = .PROM_ADRS;                   !LOADING MLPA INITIATES PROM READ
14505 ;          6924           DELAY (ONE_US);
14506 ;          6925           R_C_SAV = .MLPD;                     !GET THE ROW OR COL DATA
14507 ;          6926
14508 ;          6927           incr BIT_CNT from 0 to 9 do          !COUNT NUMBER BITS SET IN <9:0>
14509 ;          6928
14510 ;          6929               if .R_C_SAV [.BIT_CNT] IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
14511 ;          6930
14512 ;          6931           CHK_SUM = .R_C_SAV<10, 3>;           !GET THE CHECK SUM BITS
14513 ;          6932
14514 ;          6933           if .R_C_SAV [13] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 13
14515 ;          6934
14516 ;          6935           if .R_C_SAV [14] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 14
14517 ;          6936
14518 ;          6937           if .R_C_SAV [15] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 15
14519 ;          6938
14520 ;          6939           if .R_C_SAV [15] IS_SET              !IS BIT 15 SET
14521 ;          6940           then
14522 ;          6941               begin
14523 ;          6942
14524 ;          6943               if .BAD_...B_CNT lss .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
14525 ;          6944
14526 ;          6945               end
14527 ;          6946           else
14528 ;          6947               begin
14529 ;          6948
14530 ;          6949               if .BAD_NIB_CNT neq .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
14531 ;          6950
14532 ;          6951               end;
14533 ;          6952
14534 ;          6953           if .ERR_FLG IS_SET                   !WAS THERE A CHECK SUM ERROR
14535 ;          6954           then
14536 ;          6955               begin                            !REPORT INTERMEDIATE ERROR IF YES
14537 ;          6956               CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
14538 ;          6957               ERRDF (70, INTER, DUMPER);
14539 ;          6958               PRINTB (SIX_FMT, FNC_21, WRD_10, WRD_12, WRD_45, WRD_35, FNC_6);
14540 ;          6959               PRINTB (FMT_10, .CHK_SUM, .R_C_SAV);
14541 ;          6960               DODU_FLG = ONE;
14542 ;          6961               end;
14543 ;          6962
14544 ;          6963           ROW_ORED_COL = (.ROW_ORED_COL) or (.R_C_SAV);   !OR ROW AND COLUMN DATA
14545 ;          6964           PROM_ADRS = (.PROM_ADRS) or (%o'2000');!GET COLUMN DATA
14546 ;          6965           end;
14547 ;          6966
14548 ;          6967       incr index from 0 to 9 do                !GET TOTAL OFF SET COUNTS FROM THE 15 ARRAY WORDS
14549 ;          6968
14550 ;          6969           if .ROW_ORED_COL [.index] IS_SET then OFF_SET_CNT [.index] = .OFF_SET_CNT [.index] + 1;
14551 ;          6970
```

```
14553 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
14554 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (7)
14555 ;
14556 ;          6971       end;
14557 ;          6972
14558 ;          6973   CNT_14_BAD = ZEROES;
14559 ;          6974
14560 ;          6975   incr CNT from 0 to 9 do                  !COUNT HOW MANY OFFSET COUNTS GEQ 14
14561 ;          6976
14562 ;          6977       if .OFF_SET_CNT [.CNT] geq 14 then CNT_14_BAD = .CNT_14_BAD + 1;
14563 ;          6978
14564 ;          6979   if .CNT_14_BAD neq ZERO                  !WAS ANY OFF_SET COUNTS GTR ZERO
14565 ;          6980   then
14566 ;          6981       begin
14567 ;          6982       ERRDF (71, ARR_DAT, DUMPER);         !ERROR IF YES
14568 ;          6983
14569 ;          6984       if .CNT_14_BAD eql 10                !WERE ALL 10 NIBBLE OFFSETS GEQ 14
14570 ;          6985       then
14571 ;          6986           PRINTB (SIX_FMT, WRD_55, WRD_54, WRD_46, WRD_51, WRD_42, WRD_40)        !ERROR IF YES
14572 ;          6987       else                                 !IF NO THEN PRINT WHICH ONES WERE
14573 ;          6988           begin
14574 ;          6989           PRINTB (FOR_FMT, WRD_46, WRD_47, WRD_42, WRD_40);       !PRINT MESSAGE
14575 ;          6990
14576 ;          6991           incr CNT from 0 to 9 do              !FIND OFFSETS GEQ 14
14577 ;          6992
14578 ;          6993               if .OFF_SET_CNT [.CNT] geq 14 then PRINTB (FMT_13, .CNT, (.OFF_SET_CNT [.CNT]));
14579 ;          6994
14580 ;          6995                                                !PRINT NIBBLE POSITION AND COUNT
14581 ;          6996           end;
14582 ;          6997
14583 ;          6998       DODU_FLG = ONE;
14584 ;          6999       end;
14585 ;          7000
14586 ;          7001   if .DODU_FLG IS_SET                      !DROP THIS UNIT IF DODU_FLG SET
14587 ;          7002   then
14588 ;          7003       begin
14589 ;          7004       DODU (.ML_LUN);
14590 ;          7005       DOCLN;
14591 ;          7006       end;
14592 ;          7007
14593 ;          7008   ENDTST;
14597
14598                                          .SBTTL  $T24 TEST CODE SECTION
14602 052276  004167  132310          $T24:   JSR     R1,$SAVE5                       ;                       6865
14603 052302  162706  000030                  SUB     #30,SP
14604 052306  005067  143064                  CLR     P.CNT                           ;                       6903
14605 052312  152777  000040  143124          BISB    #40,@ML.REG+40                  ;                       6905
14606 052320  016705  143506                  MOV     ML.DUT,R5
14607 052324  042705  177770                  BIC     #177770,R5
```

```
14609                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
14610                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
14611
14612 052330  142777  000007  143106          BICB    #7,@ML.REG+40
14613 052336  150577  143102                  BISB    R5,@ML.REG+40
14614 052342  005066  000002                  CLR     2(SP)           ; DODU.FLG                              6907
14615 052346  152777  000040  143150          BISB    #40,@ML.REG+120 ;                                       6908
14616 052354  005002                          CLR     R2              ; CHK.SUM.ERR                           6909
14617 052356  012701  000016          1$:     MOV     #16,R1          ;                                       6912
14618 052362  060601                          ADD     SP,R1           ; OFF.SET.CNT,*
14619 052364  060201                          ADD     R2,R1           ; CNT,*
14620 052366  105011                          CLRB    (R1)
14621 052370  005202                          INC     R2              ; CNT                                   6911
14622 052372  020227  000011                  CMP     R2,#11          ; CNT,*
14623 052376  003767                          BLE     1$
14624 052400  005005                          CLR     R5              ; ADRS.CNT                              6914
14625 052402  005066  000010          2$:     CLR     10(SP)          ; ROW.ORED.COL                          6916
14626 052406  010566  000006                  MOV     R5,6(SP)        ; ADRS.CNT,PROM.ADRS                    6917
14627 052412  005004                          CLR     R4              ; TWICE                                 6919
14628 052414  005066  000004          3$:     CLR     4(SP)           ; BAD.NIB.CNT                           6921
14629 052420  005016                          CLR     (SP)            ; ERR.FLG                               6922
14630 052422  016677  000006  143054          MOV     6(SP),@ML.REG+100 ; PROM.ADRS,*                         6923
14631 052430  012701  000001                  MOV     #1,R1           ; *,$$TMP2                              6924
14632 052434  001411          4$:     BEQ     7$
14633 052436  016702  127454                  MOV     L$DLY,R2        ; *,$$TMP1
14634 052442  001404                          BEQ     6$
14635 052444  005066  000014          5$:     CLR     14(SP)          ; $$TMP
14636 052450  005302                          DEC     R2              ; $$TMP1
14637 052452  001374                          BNE     5$
14638 052454  005301          6$:     DEC     R1                      ; $$TMP2
14639 052456  000766                          BR      4$
14640 052460  017766  143150  000012  7$:     MOV     @ML.REG+230,12(SP) ; *,R.C.SAV                          6925
14641 052466  005002                          CLR     R2              ; BIT.CNT                               6927
14642 052470  010201          8$:     MOV     R2,R1           ; BIT.CNT,*                             6929
14643 052472  006201                          ASR     R1
14644 052474  006201                          ASR     R1
14645 052476  006201                          ASR     R1
14646 052500  012700  000012                  MOV     #12,R0
14647 052504  060600                          ADD     SP,R0           ; R.C.SAV,*
14648 052506  060001                          ADD     R0,R1
14649 052510  010146                          MOV     R1,-(SP)
14650 052512  010246                          MOV     R2,-(SP)        ; BIT.CNT,*
14651 052514  042716  177770                  BIC     #177770,(SP)
14652 052520  012746  000001                  MOV     #1,-(SP)
14653 052524  005046                          CLR     -(SP)
14654 052526  004767  131102                  JSR     PC,BL$GT2
14655 052532  062706  000010                  ADD     #10,SP
14656 052536  005300                          DEC     R0
14657 052540  001002                          BNE     9$
14658 052542  005266  000004                  INC     4(SP)           ; BAD.NIB.CNT
14659 052546  005202          9$:     INC     R2              ; BIT.CNT                               6927
14660 052550  020227  000011                  CMP     R2,#11          ; BIT.CNT,*
14661 052554  003745                          BLE     8$
14662 052556  016603  000012                  MOV     12(SP),R3       ; R.C.SAV,CHK.SUM                       6931
14663 052562  006203                          ASR     R3              ; CHK.SUM
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

052564  006203                                  ASR     R3                          ; CHK.SUM
052566  000303                                  SWAB    R3                          ; CHK.SUM
052570  042703  177770                          BIC     #177770,R3                  ; *,CHK.SUM
052574  132766  000040  000013                  BITB    #40,13(SP)                  ; *,R.C.SAV+1                   6933
052602  001401                                  BEQ     10$
052604  005203                                  INC     R3                          ; CHK.SUM
052606  132766  000100  000013  10$:            BITB    #100,13(SP)                 ; *,R.C.SAV+1                   6935
052614  001401                                  BEQ     11$
052616  005203                                  INC     R3                          ; CHK.SUM
052620  005002                  11$:            CLR     R2                          ;                               6937
052622  105766  000013                          TSTB    13(SP)                      ; R.C.SAV+1
052626  100002                                  BPL     12$
052630  005202                                  INC     R2
052632  005203                                  INC     R3                          ; CHK.SUM
052634  006002                  12$:            ROR     R2                          ;                               6939
052636  103004                                  BCC     13$
052640  026603  000004                          CMP     4(SP),R3                    ; BAD.NIB.CNT,CHK.SUM           6943
052644  002006                                  BGE     15$
052646  000403                                  BR      14$
052650  026603  000004          13$:            CMP     4(SP),R3                    ; BAD.NIB.CNT,CHK.SUM           6949
052654  001402                                  BEQ     15$
052656  012716  000001          14$:            MOV     #1,(SP)                     ; *,ERR.FLG
052662  021627  000001          15$:            CMP     (SP),#1                     ; ERR.FLG,*                     6953
052666  001052                                  BNE     16$
052670  005267  142502                          INC     P.CNT                       ;                               6955
052674  026767  142476  142476                  CMP     P.CNT,LIMIT
052702  003060                                  BGT     17$
052704  104455                                  TRAP    55                          ;                               6957
052706  000106                                  .WORD   106
052710  013114                                  .WORD   INTER
052712  026302                                  .WORD   DUMPER
052714  012746  012226                          MOV     #FNC.6,-(SP)                ;                               6958
052720  012746  011110                          MOV     #WRD.35,-(SP)
052724  012746  011214                          MOV     #WRD.45,-(SP)
052730  012746  010650                          MOV     #WRD.12,-(SP)
052734  012746  010630                          MOV     #WRD.10,-(SP)
052740  012746  012440                          MOV     #FNC.21,-(SP)
052744  012746  010322                          MOV     #SIX.FMT,-(SP)
052750  012746  000007                          MOV     #7,-(SP)
052754  010600                                  MOV     SP,R0                       ; SP,*
052756  104414                                  TRAP    14
052760  016616  000032                          MOV     32(SP),(SP)                 ; R.C.SAV,*                     6959
052764  010346                                  MOV     R3,-(SP)                    ; CHK.SUM,*
052766  012746  007116                          MOV     #FMT.10,-(SP)
052772  012746  000003                          MOV     #3,-(SP)
052776  010600                                  MOV     SP,R0                       ; SP,*
053000  104414                                  TRAP    14
053002  012766  000001  000030                  MOV     #1,30(SP)                   ; *,DODU.FLG                    6960
053010  062706  000026                          ADD     #26,SP                      ;                               6955
053014  056666  000012  000010  16$:            BIS     12(SP),10(SP)               ; R.C.SAV,ROW.ORED.COL          6963
053022  052766  002000  000006                  BIS     #2000,6(SP)                 ; *,PROM.ADRS                   6964
053030  005204                                  INC     R4                          ; TWICE                         6919
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

053032  020427  000001                          CMP     R4,#1                   ; TWICE,*
053036  003002                                  BGT     17$
053040  000167  177350                          JMP     3$
053044  005002                          17$:    CLR     R2                      ; INDEX                                 6967
053046  010201                          18$:    MOV     R2,R1                   ; INDEX,*                               6969
053050  006201                                  ASR     R1
053052  006201                                  ASR     R1
053054  006201                                  ASR     R1
053056  012700  000010                          MOV     #10,R0
053062  060600                                  ADD     SP,R0                   ; ROW.ORED.COL,*
053064  060001                                  ADD     R0,R1
053066  010146                                  MOV     R1,-(SP)
053070  010246                                  MOV     R2,-(SP)                ; INDEX,*
053072  042716  177770                          BIC     #177770,(SP)
053076  012746  000001                          MOV     #1,-(SP)
053102  005046                                  CLR     -(SP)
053104  004767  130524                          JSR     PC,BL$GT2
053110  062706  000010                          ADD     #10,SP
053114  005300                                  DEC     R0
053116  001005                                  BNE     19$
053120  012701  000016                          MOV     #16,R1
053124  060601                                  ADD     SP,R1                   ; OFF.SET.CNT,*
053126  060201                                  ADD     R2,R1                   ; INDEX,*
053130  105211                                  INCB    (R1)
053132  005202                          19$:    INC     R2                      ; INDEX                                 6967
053134  020227  000011                          CMP     R2,#11                  ; INDEX,*
053140  003742                                  BLE     18$
053142  005205                                  INC     R5                      ; ADRS.CNT                              6914
053144  020527  000016                          CMP     R5,#16                  ; ADRS.CNT,*
053150  003002                                  BGT     20$
053152  000167  177224                          JMP     2$
053156  005000                          20$:    CLR     R0                      ; CNT.14.BAD                            6973
053160  005001                                  CLR     R1                      ; CNT                                   6975
053162  012702  000016                  21$:    MOV     #16,R2                  ;                                       6977
053166  060602                                  ADD     SP,R2                   ; OFF.SET.CNT,*
053170  060102                                  ADD     R1,R2                   ; CNT,*
053172  121227  000016                          CMPB    (R2),#16
053176  103401                                  BLO     22$
053200  005200                                  INC     R0                      ; CNT.14.BAD
053202  005201                          22$:    INC     R1                      ; CNT                                   6975
053204  020127  000011                          CMP     R1,#11                  ; CNT,*
053210  003764                                  BLE     21$
053212  005700                                  TST     R0                      ; CNT.14.BAD                            6979
053214  001505                                  BEQ     27$
053216  104455                                  TRAP    55                      ;                                       6982
053220  000107                                  .WORD   107
053222  013012                                  .WORD   ARR.DAT
053224  026302                                  .WORD   DUMPER
053226  020027  000012                          CMP     R0,#12                  ; CNT.14.BAD,*                          6984
053232  001024                                  BNE     23$
053234  012746  011150                          MOV     #WRD.40,-(SP)           ;                                       6986
053240  012746  011170                          MOV     #WRD.42,-(SP)
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

053244  012746  011276                          MOV     #WRD.51,-(SP)
053250  012746  011226                          MOV     #WRD.46,-(SP)
053254  012746  011326                          MOV     #WRD.54,-(SP)
053260  012746  011336                          MOV     #WRD.55,-(SP)
053264  012746  010322                          MOV     #SIX.FMT,-(SP)
053270  012746  000007                          MOV     #7,-(SP)
053274  010600                                  MOV     SP,R0                           ; SP,*
053276  104414                                  TRAP    14
053300  022626                                  CMP     (SP)+,(SP)+
053302  000445                                  BR      26$                             ;                                       6984
053304  012746  011150                  23$:    MOV     #WRD.40,-(SP)                   ;                                       6989
053310  012746  011170                          MOV     #WRD.42,-(SP)
053314  012746  011240                          MOV     #WRD.47,-(SP)
053320  012746  011226                          MOV     #WRD.46,-(SP)
053324  012746  010270                          MOV     #FOR.FMT,-(SP)
053330  012746  000005                          MOV     #5,-(SP)
053334  010600                                  MOV     SP,R0                           ; SP,*
053336  104414                                  TRAP    14
053340  005002                                  CLR     R2                              ; CNT                                   6991
053342  012701  000032                  24$:    MOV     #32,R1                          ;                                       6993
053346  060601                                  ADD     SP,R1                           ; OFF.SET.CNT,*
053350  060201                                  ADD     R2,R1                           ; CNT,*
053352  121127  000016                          CMPB    (R1),#16
053356  103413                                  BLO     25$
053360  005046                                  CLR     -(SP)
053362  111116                                  MOVB    (R1),(SP)
053364  010246                                  MOV     R2,-(SP)                        ; CNT,*
053366  012746  007254                          MOV     #FMT.13,-(SP)
053372  012746  000003                          MOV     #3,-(SP)
053376  010600                                  MOV     SP,R0                           ; SP,*
053400  104414                                  TRAP    14
053402  062706  000010                          ADD     #10,SP
053406  005202                          25$:    INC     R2                              ; CNT                                   6991
053410  020227  000011                          CMP     R2,#11                          ; CNT,*
053414  003752                                  BLE     24$
053416  012766  000001  000016          26$:    MOV     #1,16(SP)                       ; *,DODU.FLG                            6998
053424  062706  000014                          ADD     #14,SP                          ;                                       6981
053430  026627  000002  000001          27$:    CMP     2(SP),#1                        ; DODU.FLG,*                            7001
053436  001004                                  BNE     28$
053440  016700  142364                          MOV     ML.LUN.R0                       ;                                       7004
053444  104451                                  TRAP    51
053446  104444                                  TRAP    44
053450  062706  000030                  28$:    ADD     #30,SP                          ;                                       6865
053454  000207                                  RTS     PC

                                        ; Routine Size:  312 words
                                        ; Maximum stack depth per invocation:  29 words
```

```
14838
14839                                   .SBTTL  T24 TEST CODE SECTION
14843 053456                    T24::
14844 053456  004767  176614  1$:     JSR     PC,$T24                 ;       7006
14845 053462  104466                  TRAP    66
14846 053464  006000                  ROR     R0
14847 053466  103773                  BLO     1$
14848 053470  000207                  RTS     PC
14849
14850                           ; Routine Size:  6 words
14851                           ; Maximum stack depth per invocation:  0 words
14856
14857
14858 ;         7009  !<BLF/PAGE>
```

```
14860 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
14861 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (77)
14862
14863 ;          7010  !
14864 ;          7011  !
14865 ;          7012  BGNTST;
14866 ;          7013
14867 ;          7014  !++
14868 ;          7015  ! TEST NUMBER:  TST 25
14869 ;          7016  !
14870 ;          7017  ! TEST NAME:    PROM OR FUNCTION TEST
14871 ;          7018  !
14872 ;          7019  ! TEST DESCRIPTION:
14873 ;          7020  !
14874 ;          7021  !       TEST THE HARDWARE ORING OF
14875 ;          7022  !       THE MEMORY ARRAYS' PROM
14876 ;          7023  !       ROW COLUMN DATA BY:
14877 ;          7024  !
14878 ;          7025  !       1.  READING AND STORING 128
14879 ;          7026  !           HARDWARE ORED ROW COLUMN
14880 ;          7027  !           DATA.
14881 ;          7028  !
14882 ;          7029  !       2.  THEN IN PROM DISABLE MODE
14883 ;          7030  !           AND VIA SOFTWARE CONTROL,
14884 ;          7031  !           READ AND OR PROM ROW
14885 ;          7032  !           COLUMN DATA AND COMPARE
14886 ;          7033  !           AGAINST THE RESPECTIVE
14887 ;          7034  !           STORED HARDWARE ORED DATA.
14888 ;          7035  !
14889 ;          7036  !--
14890 ;          7037
14891 ;          7038  local
14892 ;          7039      R_BITS,                   !PROM ROW DATA
14893 ;          7040      C_BITS,                   !PROM COL DATA
14894 ;          7041      SW_ORED,                  !SOFTWARE CALCULATED PROM ORED DATA
14895 ;          7042      HW_SAVE,                  !SOFTWARE  PROM ORED DATA
14896 ;          7043      DODU_FLG;                 !DROP UNIT FLAG
14897 ;          7044
14898 ;          7045  BGNSUB;
14899 ;          7046  CLR_THRESHOLD;                !CLEAR ERROR PRINT THRESHOLD
14900 ;          7047  CLR_MBUS;
14901 ;          7048  DODU_FLG = ZERO;
14902 ;          7049  DAT_DM = ONE;
14903 ;          7050  FIRST_BLK_XFER ();            !SET UP A FIRST BLOCK XFER
14904 ;          7051  ML_FUNC = write;              !DO A WRITE FUNCTION
14905 ;          7052
14906 ;          7053  incr PROM_ADRS from 0 to 127 do   !READ AND STORE 128 HARDWARE PROM ORED DATA
14907 ;          7054      begin
14908 ;          7055      DELAY (ONE_US);
14909 ;          7056      HW_OR_TBL [.PROM_ADRS] = .MLPD;   !READ HARDWARE PROM ORED DATA
14910 ;          7057      DAT_CLK = ONE;            !CLOCK NEXT ONE OUT
14911 ;          7058      end;
14912 ;          7059
14913 ;          7060  CLR_MBUS;
14914 ;          7061  PROM_DIS = ONE;               !SET PROM DISABLE MODE
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (77)

;
;                incr PROM_ADRS from 0 to 127 do                        !CALCULATE 128 SW ORED DATA & COMPARE TO HW TABLE
;                    begin
;                    MLPA = .PROM_ADRS;                                 !LOADING MLPA INITIATES A PROM READ
;                    DELAY (ONE_US);
;                    R_BITS = .MLPD;                                    !SAVE ROW DATA
;                    MLPA = .PROM_ADRS or %o'2000';                     !ENABLE COLUMN DATA ADRS
;                    DELAY (ONE_US);
;                    C_BITS = .MLPD;                                    !SAVE COL DATA
;                    SW_ORED = .R_BITS or .C_BITS;                      !CALCULATE SOFTWARE ORED
;                    HW_SAVE = .HW_OR_TBL [.PROM_ADRS];                 !GET RESPECTIVE HARDWARE ORED
;
;                    if (.HW_SAVE<0, 9>) neq (.SW_ORED<0, 9>)           !COMPARE SW & HW ORED
;                    then
;                        begin                                          !IF NEQ THEN ERROR
;                        CMP_THRESHOLD;                                 !COMPARE ERROR PRINT THRESHOLD
;                        ERRDF (76, ARR_DAT, DUMPER);
;                        PRINTB (FOR_FMT, WRD_35, WRD_36, WRD_19, PHR_4);
;                        PRINTB (FMT_2, .SW_ORED<0, 9>, .HW_SAVE<0, 9>, (.SW_ORED<0, 9> xor .HW_SAVE<0, 9>));
;                        DODU_FLG = ONE;
;                        end;
;
;                    end;
;
;                ENDSUB;
;
;                if .DODU_FLG IS_SET                                    !DROP THIS UNIT IF DODU FLG IS_SET
;                then
;                    begin
;                    DODU (.ML_LUN);
;                    DOCLN;
;                    end;
;
;                ENDTST;

                                        .SBTTL  $T25 TEST CODE SECTION
053472  004167  131114          $T25:   JSR     R1,$SAVE5                       ;                                7008
053476  162706  000010                  SUB     #10,SP
053502  104402                  1$:     TRAP    2                               ;                                7043
053504  005067  141666                  CLR     P.CNT                           ;                                7045
053510  152777  000040  141726          BISB    #40,@ML.REG+40                  ;                                7046
053516  016705  142310                  MOV     ML.DUT,R5
053522  042705  177770                  BIC     #177770,R5
053526  142777  000007  141710          BICB    #7,@ML.REG+40
053534  150577  141704                  BISB    R5,@ML.REG+40
053540  005016                          CLR     (SP)                            ; DODU.FLG                       7048
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

053542  152777  000010  141754                  BISB    #10,@ML.REG+120                 ;                                       7049
053550  004767  144506                          JSR     PC,FIRST.BLK.XFER               ;                                       7050
053554  142777  000077  141622                  BICB    #77,@ML.REG                     ;                                       7051
053562  152777  000061  141614                  BISB    #61,@ML.REG
053570  005004                                  CLR     R4                              ; PROM.ADRS                             7053
053572  012703  000001                  2$:     MOV     #1,R3                           ; *,$$TMP2                              7055
053576  001411                          3$:     BEQ     6$
053600  016705  126312                          MOV     L$DLY,R5                        ; *,$$TMP1
053604  001404                                  BEQ     5$
053606  005066  000006                  4$:     CLR     6(SP)                           ; $$TMP
053612  005305                                  DEC     R5                              ; $$TMP1
053614  001374                                  BNE     4$
053616  005303                          5$:     DEC     R3                              ; $$TMP2
053620  000766                                  BR      3$
053622  010405                          6$:     MOV     R4,R5                           ; PROM.ADRS,*                           7056
053624  006305                                  ASL     R5
053626  017765  142002  013402                  MOV     @ML.REG+230,HW.OR.TBL(R5)
053634  152777  000020  141662                  BISB    #20,@ML.REG+120                 ;                                       7057
053642  005204                                  INC     R4                              ; PROM.ADRS                             7053
053644  020427  000177                          CMP     R4,#177                         ; PROM.ADRS,*
053650  003750                                  BLE     2$
053652  152777  000040  141564                  BISB    #40,@ML.REG+40                  ;                                       7058
053660  016705  142146                          MOV     ML.DUT,R5
053664  042705  177770                          BIC     #177770,R5
053670  142777  000007  141546                  BICB    #7,@ML.REG+40
053676  150577  141542                          BISB    R5,@ML.REG+40
053702  152777  000040  141614                  BISB    #40,@ML.REG+120                 ;                                       7061
053710  005003                                  CLR     R3                              ; PROM.ADRS                             7063
053712  010377  141566                  7$:     MOV     R3,@ML.REG+100                  ; PROM.ADRS,*                           7065
053716  012704  000001                          MOV     #1,R4                           ; *,$$TMP2                              7066
053722  001411                          8$:     BEQ     11$
053724  016705  126166                          MOV     L$DLY,R5                        ; *,$$TMP1
053730  001404                                  BEQ     10$
053732  005066  000006                  9$:     CLR     6(SP)                           ; $$TMP
053736  005305                                  DEC     R5                              ; $$TMP1
053740  001374                                  BNE     9$
053742  005304                          10$:    DEC     R4                              ; $$TMP2
053744  000766                                  BR      8$
053746  017766  141662  000004          11$:    MOV     @ML.REG+230,4(SP)               ; *,R.BITS                              7067
053754  010305                                  MOV     R3,R5                           ; PROM.ADRS,*                           7068
053756  052705  002000                          BIS     #2000,R5
053762  010577  141516                          MOV     R5,@ML.REG+100
053766  012704  000001                          MOV     #1,R4                           ; *,$$TMP2                              7069
053772  001411                          12$:    BEQ     15$
053774  016705  126116                          MOV     L$DLY,R5                        ; *,$$TMP1
054000  001404                                  BEQ     14$
054002  005066  000006                  13$:    CLR     6(SP)                           ; $$TMP
054006  005305                                  DEC     R5                              ; $$TMP1
054010  001374                                  BNE     13$
054012  005304                          14$:    DEC     R4                              ; $$TMP2
054014  000766                                  BR      12$
054016  017766  141612  000002          15$:    MOV     @ML.REG+230,2(SP)               ; *,C.BITS                              7070
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

054024  016601  000004                          MOV     4(SP),R1                        ; R.BITS,SW.ORED                        7071
054030  056601  000002                          BIS     2(SP),R1                        ; C.BITS,SW.ORED
054034  010305                                  MOV     R3,R5                           ; PROM.ADRS,*                           7072
054036  006305                                  ASL     R5
054040  016502  013402                          MOV     HW.OR.TBL(R5),R2                ; *,HW.SAVE
054044  010104                                  MOV     R1,R4                           ; SW.ORED,*                             7074
054046  042704  177000                          BIC     #177000,R4
054052  010205                                  MOV     R2,R5                           ; HW.SAVE,*
054054  042705  177000                          BIC     #177000,R5
054060  020504                                  CMP     R5,R4
054062  001457                                  BEQ     16$
054064  005267  141306                          INC     P.CNT                           ;                                       7076
054070  026767  141302  141302                  CMP     P.CNT,LIMIT
054076  003055                                  BGT     17$
054100  104455                                  TRAP    55                              ;                                       7078
054102  000114                                  .WORD   114
054104  013012                                  .WORD   ARR.DAT
054106  026302                                  .WORD   DUMPER
054110  012746  011676                          MOV     #PHR.4,-(SP)                    ;                                       7079
054114  012746  010730                          MOV     #WRD.19,-(SP)
054120  012746  011116                          MOV     #WRD.36,-(SP)
054124  012746  011110                          MOV     #WRD.35,-(SP)
054130  012746  010270                          MOV     #FOR.FMT,-(SP)
054134  012746  000005                          MOV     #5,-(SP)
054140  010600                                  MOV     SP,R0                           ; SP,*
054142  104414                                  TRAP    14
054144  010205                                  MOV     R2,R5                           ; HW.SAVE,*                             7080
054146  010116                                  MOV     R1,(SP)                         ; SW.ORED,*
054150  010504                                  MOV     R5,R4
054152  040104                                  BIC     R1,R4
054154  040516                                  BIC     R5,(SP)
054156  050416                                  BIS     R4,(SP)
054160  010246                                  MOV     R2,-(SP)                        ; HW.SAVE,*
054162  042716  177000                          BIC     #177000,(SP)
054166  010146                                  MOV     R1,-(SP)                        ; SW.ORED,*
054170  042716  177000                          BIC     #177000,(SP)
054174  012746  006506                          MOV     #FMT.2,-(SP)
054200  012746  000004                          MOV     #4,-(SP)
054204  010600                                  MOV     SP,R0                           ; SP,*
054206  104414                                  TRAP    14
054210  012766  000001  000024                  MOV     #1,24(SP)                       ; *,DODU.FLG                            7081
054216  062706  000024                          ADD     #24,SP                          ;                                       7076
054222  005203                          16$:    INC     R3                              ; PROM.ADRS                             7063
054224  020327  000177                          CMP     R3,#177                         ; PROM.ADRS,*
054230  003630                                  BLE     7$
054232  104467                          17$:    TRAP    67                              ;                                       7084
054234  006000                                  ROR     R0
054236  103002                                  BHIS    18$
054240  000167  177236                          JMP     1$
054244  021627  000001                  18$:    CMP     (SP),#1                         ; DODU.FLG,*                            7088
054250  001004                                  BNE     19$
054252  016700  141552                          MOV     ML.LUN,R0                       ;                                       7091
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

054256  104451                                  TRAP    51
054260  104444                                  TRAP    44
054262  062706  000010                  19$:    ADD     #10,SP                  ;                                       7008
054266  000207                                  RTS     PC

                                        ; Routine Size:  191 words
                                        ; Maximum stack depth per invocation:  20 words



                                                .SBTTL  T25 TEST CODE SECTION
054270                                  T25::
054270  004767  177176                  1$:     JSR     PC,$T25                 ;                                       7093
054274  104466                                  TRAP    66
054276  006000                                  ROR     R0
054300  103773                                  BLO     1$
054302  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          7096  !<BLF/PAGE>
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15125 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15126 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)
15127
15128 ;          7097  !
15129 ;          7098
15130 ;          7099  BGNTST;
15131 ;          7100
15132 ;          7101  !++
15133 ;          7102  ! TEST NUMBER:  TST 26
15134 ;          7103  !
15135 ;          7104  ! TEST NAME:    UV ADRS ERROR TEST
15136 ;          7105  !
15137 ;          7106  ! TEST DESCRIPTION:
15138 ;          7107  !
15139 ;          7108  !       TEST THE DETECTION OF UV ADRS
15140 ;          7109  !       ERRORS BY:
15141 ;          7110  !
15142 ;          7111  !       1.  GENERATING PROM DATA PATTERN
15143 ;          7112  !           FROM 0 TO %O'177777' AND
15144 ;          7113  !           DETERMINE WHETHER RESPECTIVE
15145 ;          7114  !           PATTERN IS GOOD/OR BAD
15146 ;          7115  !           PROM DATA.
15147 ;          7116  !
15148 ;          7117  !       2.  VIA DAT_DM AND PROM R/W
15149 ;          7118  !           MODES PRESENT GENERATED
15150 ;          7119  !           PROM DATA TO THE UV ADRS
15151 ;          7120  !           ERR PROM.
15152 ;          7121  !
15153 ;          7122  !       3.  TEST ERROR CONDITIONS FOR
15154 ;          7123  !           CORRECT RESPONCE TO GOOD/
15155 ;          7124  !           OR BAD PROM DATA.
15156 ;          7125  !
15157 ;          7126  !--
15158 ;          7127
15159 ;          7128  local
15160 ;          7129      HIGH_CNT,                     !STORES PROM DATA CHECK SUM BITS
15161 ;          7130      PROM_DATA : bitvector [16],   !STORES PROM DATA
15162 ;          7131      LOW_CNT,                      !STORES SUM OF PROM DATA BITS <9:0>
15163 ;          7132      TEMP,                         !TEMPORARY STORAGE
15164 ;          7133      ERR_FLG,                      !ERROR FLAG
15165 ;          7134      GTR_FLG;                      !SETS WHEN PROM DATA BIT 15 IS A ONE
15166 ;          7135
15167 ;          7136  CLR_THRESHOLD;                    !CLEAR ERROR PRINT THRESHOLD
15168 ;          7137  PROM_DATA = -1;
15169 ;          7138
15170 ;          7139  do                              !TEST ALL POSSIBLE PROM DATA COMBINATIONS
15171 ;          7140      begin
15172 ;          7141      PROM_DATA = .PROM_DATA + 1; !INCREMENT PROM_DATA
15173 ;          7142      BGNSUB;
15174 ;          7143      CLR_MBUS;
15175 ;          7144      ERR_FLG = ZERO;
15176 ;          7145      LOW_CNT = ZEROES;
15177 ;          7146      HIGH_CNT = ZEROES;
15178 ;          7147      GTR_FLG = ZERO;
15179 ;          7148
```

```
15181 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15182 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)
15183 ;
15184 ;          7149       incr BIT_CNT from 0 to 9 do                 !COUNT PROM DATA BITS <9:0>
15185 ;          7150
15186 ;          7151           if .PROM_DATA [.BIT_CNT] IS_SET then LOW_CNT = .LOW_CNT + 1;
15187 ;          7152
15188 ;          7153       HIGH_CNT = .PROM_DATA<10, 3>;               !GET PROM DATA CHECK SUM BITS
15189 ;          7154
15190 ;          7155       if .PROM_DATA [13] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 13 IF SET
15191 ;          7156
15192 ;          7157       if .PROM_DATA [14] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 14 IF SET
15193 ;          7158
15194 ;          7159       if .PROM_DATA [15] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 15 IF SET
15195 ;          7160
15196 ;          7161       if .PROM_DATA [15] IS_SET then GTR_FLG = ONE;       !SET FLAG IF BIT 15 IS SET
15197 ;          7162
15198 ;          7163       DAT_DM_XFER ();                             !SET UP A DATA DIAG MODE XFERR
15199 ;          7164       PROM_RQ = ONE;                              !SET PROM READ WRITE
15200 ;          7165       MLPD = .PROM_DATA;                          !LOAD MLPD WITH PROM_DATA
15201 ;          7166       MLCS1 = write;                              !DO A WRITE FUNCTION
15202 ;          7167       DAT_CLK = ONE;                              !CLOCK PROM DATA INTO UV PROM
15203 ;          7168
15204 ;          7169       if .UNS IS_SET                              !SEE IF PROM DATA CAUSED A UV ERROR
15205 ;          7170       then
15206 ;          7171           begin
15207 ;          7172
15208 ;          7173           if .GTR_FLG IS_SET                      !UNS IS_SET. SEE IF GTR FLG IS SET
15209 ;          7174           then
15210 ;          7175               begin
15211 ;          7176               TEMP = .PROM_DATA;                  !LOAD TEMP WITH PROM DATA
15212 ;          7177               TEMP = .TEMP and %o'162000';        !SEE IF THESE BITS ARE SET IN PROM DATA
15213 ;          7178
15214 ;          7179               if .TEMP eql %o'162000'             !THESE BITS SET AUTOMATICALLY CAUSE A UNS
15215 ;          7180               then
15216 ;          7181                   begin
15217 ;          7182
15218 ;          7183                   if .LOW_CNT geq .HIGH_CNT
15219 ;          7184                                           !LOW<9:0> SHOULD BE ISS THAN THE HIGH<15:10> IF GTR FLG IS SET
15220 ;          7185                   then
15221 ;          7186                       begin               !ERROR IF LOW<9:0> IS GEQ HIGH<15:10>
15222 ;          7187                       CMP_THRESHOLD;      !COMPARE ERROR PRINT THRESHOLD
15223 ;          7188                       ERRDF (72, ARR_DAT, DUMPER);
15224 ;          7189                       PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
15225 ;          7190                       ERR_FLG = ONE;
15226 ;          7191                       end;
15227 ;          7192
15228 ;          7193                   end;
15229 ;          7194
15230 ;          7195               end
15231 ;          7196           else                                !GTR FLG IS NOT SET
15232 ;          7197               begin
15233 ;          7198
15234 ;          7199               if .LOW_CNT eql .HIGH_CNT       !LOW<9:0> SHOULD BE NEQ HIGH<15:10>
15235 ;          7200               then
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)
;
;        7201                begin                              !ERROR IF EQL
;        7202                CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;        7203                ERRDF (73, ARR_DAT, DUMPER);
;        7204                PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
;        7205                ERR_FLG = ONE;
;        7206                end;
;        7207
;        7208            end
;        7209
;        7210        end
;        7211    else                                           !UNS WAS NOT SET
;        7212        begin
;        7213
;        7214        if .GTR_FLG IS_SET                         !SEE IF GTR FLG IS_SET
;        7215        then
;        7216            begin
;        7217            TEMP = .PROM_DATA;                     !LOAD TEMP WITH PROM DATA
;        7218            TEMP = .TEMP and %o'162000';           !SEE IF THESE BITS ARE SET IN PROM DATA
;        7219
;        7220            if .TEMP neq %o'162000'                !IF THESE BITS ARE SET THEN UNS SHOULD BE SET
;        7221            then
;        7222                begin                              !ERROR UNS IS NOT SET
;        7223                CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;        7224                ERRDF (74, ARR_DAT, DUMPER);
;        7225                PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;        7226                ERR_FLG = ONE;
;        7227                end
;        7228            else                                   !BITS 162000 ARE NOT SET
;        7229                begin
;        7230
;        7231                if .LOW_CNT lss .HIGH_CNT          !LOW<9:0> SHOULD BE GEQ HIGH<15:10>
;        7232                then
;        7233                    begin                          !ERROR IF LSS
;        7234                    CMP_THRESHOLD;                 !COMPARE ERROR PRINT THRESHOLD
;        7235                    ERRDF (75, ARR_DAT, DUMPER);
;        7236                    PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;        7237                    ERR_FLG = ONE;
;        7238                    end;
;        7239
;        7240                end
;        7241
;        7242            end
;        7243        else                                       !GTR_FLG IS NOT SET
;        7244            begin
;        7245
;        7246            if .LOW_CNT neq .HIGH_CNT              !LOW<9:0> SHOULD EQL HIGH<15:10>
;        7247            then
;        7248                begin                              !ERROR IF NEQ
;        7249                CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;        7250                ERRDF (108, ARR_DAT, DUMPER);
;        7251                PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;        7252                ERR_FLG = ONE;
```

```
                                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)
 15293 ;ML4AD
 15294 ;                 TEST CODE SECTION
 15295
 15296 ;          7253                   end
 15297 ;          7254
 15298 ;          7255               end
 15299 ;          7256
 15300 ;          7257           end;
 15301 ;          7258
 15302 ;          7259       if .ERR_FLG IS_SET                       !SEE IF ERROR FLG GOT SET
 15303 ;          7260       then
 15304 ;          7261           begin                                !PRINT FAILING PROM_DATA AND SET DODU_FLG
 15305 ;          7262           PRINTB (FMT_7, .PROM_DATA);
 15306 ;          7263           end;
 15307 ;          7264
 15308 ;          7265       ENDSUB;
 15309 ;          7266       end
 15310 ;          7267   until .PROM_DATA eql %o'177777';             !TRY ALL BIT COMBINATIONS
 15311 ;          7268
 15312 ;          7269   ENDTST;
 15316
 15317                                          .SBTTL  $T26 TEST CODE SECTION
 15321 054304  004167  130302          $T26:   JSR     R1,$SAVE5                ;                          7095
 15322 054310  162706  000010                  SUB     #10,SP
 15323 054314  005067  141056                  CLR     P.CNT                    ;                          7134
 15324 054320  012766  177777  000006          MOV     #-1,6(SP)                ; *,PROM.DATA              7137
 15325 054326  005266  000006          1$:     INC     6(SP)                    ; PROM.DATA                7141
 15326 054332  104402                  2$:     TRAP    2
 15327 054334  152777  000040  141102          BISB    #40,@ML.REG+40           ;                          7142
 15328 054342  016705  141464                  MOV     ML.DUT,R5
 15329 054346  042705  177770                  BIC     #177770,R5
 15330 054352  142777  000007  141064          BICB    #7,@ML.REG+40
 15331 054360  150577  141060                  BISB    R5,@ML.REG+40
 15332 054364  005001                          CLR     R1                       ; ERR.FLG                  7144
 15333 054366  005066  000002                  CLR     2(SP)                    ; LOW.CNT                  7145
 15334 054372  005002                          CLR     R2                       ; HIGH.CNT                 7146
 15335 054374  005066  000004                  CLR     4(SP)                    ; GTR.FLG                  7147
 15336 054400  005005                          CLR     R5                       ; BIT.CNT                  7149
 15337 054402  010504                  3$:     MOV     R5,R4                    ; BIT.CNT,*                7151
 15338 054404  006204                          ASR     R4
 15339 054406  006204                          ASR     R4
 15340 054410  006204                          ASR     R4
 15341 054412  012703  000006                  MOV     #6,R3
 15342 054416  060603                          ADD     SP,R3                    ; PROM.DATA,*
 15343 054420  060304                          ADD     R3,R4
 15344 054422  010446                          MOV     R4,-(SP)
 15345 054424  010546                          MOV     R5,-(SP)                 ; BIT.CNT,*
 15346 054426  042716  177770                  BIC     #177770,(SP)
 15347 054432  012746  000001                  MOV     #1,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

054436  005046                                  CLR     -(SP)
054440  004767  127170                          JSR     PC,BL$GT2
054444  062706  000010                          ADD     #10,SP
054450  005300                                  DEC     R0
054452  001002                                  BNE     4$
054454  005266  000002                          INC     2(SP)                   ; LOW.CNT
054460  005205                          4$:     INC     R5                      ; BIT.CNT                       7149
054462  020527  000011                          CMP     R5,#11                  ; BIT.CNT,*
054466  003745                                  BLE     3$
054470  016602  000006                          MOV     6(SP),R2                ; PROM.DATA,HIGH.CNT            7153
054474  006202                                  ASR     R2                      ; HIGH.CNT
054476  006202                                  ASR     R2                      ; HIGH.CNT
054500  000302                                  SWAB    R2                      ; HIGH.CNT
054502  042702  177770                          BIC     #177770,R2              ; *,HIGH.CNT
054506  132766  000040  000007                  BITB    #40,7(SP)               ; *,PROM.DATA+1                 7155
054514  001401                                  BEQ     5$
054516  005202                                  INC     R2                      ; HIGH.CNT
054520  132766  000100  000007          5$:     BITB    #100,7(SP)              ; *,PROM.DATA+1                 7157
054526  001401                                  BEQ     6$
054530  005202                                  INC     R2                      ; HIGH.CNT
054532  005005                          6$:     CLR     R5                      ;                               7159
054534  105766  000007                          TSTB    7(SP)                   ; PROM.DATA+1
054540  100002                                  BPL     7$
054542  005205                                  INC     R5
054544  005202                                  INC     R2                      ; HIGH.CNT
054546  006005                          7$:     ROR     R5                      ;                               7161
054550  103003                                  BCC     8$
054552  012766  000001  000004                  MOV     #1,4(SP)                ; *,GTR.FLG
054560  004767  141626                  8$:     JSR     PC,DAT.DM.XFER          ;                               7163
054564  152777  000100  140732                  BISB    #100,@ML.REG+120        ;                               7164
054572  016605  000006                          MOV     6(SP),R5                ; PROM.DATA,*                   7165
054576  010577  141032                          MOV     R5,@ML.REG+230
054602  012777  000061  140574                  MOV     #61,@ML.REG             ;                               7166
054610  152777  000020  140706                  BISB    #20,@ML.REG+120         ;                               7167
054616  032777  040000  140640                  BIT     #40000,@ML.REG+60       ;                               7169
054624  001514                                  BEQ     12$
054626  026627  000004  000001                  CMP     4(SP),#1                ; GTR.FLG,*                     7173
054634  001050                                  BNE     11$
054636  010516                                  MOV     R5,(SP)                 ; *,TEMP                        7176
054640  042716  015777                          BIC     #15777,(SP)             ; *,TEMP                        7177
054644  021627  162000                          CMP     (SP),#-16000            ; TEMP,*                        7179
054650  001003                                  BNE     9$
054652  026602  000002                          CMP     2(SP),R2                ; LOW.CNT,HIGH.CNT              7183
054656  002002                                  BGE     10$
054660  000167  000516                  9$:     JMP     19$
054664  005267  140506                  10$:    INC     P.CNT                   ;                               7186
054670  026767  140502  140502                  CMP     P.CNT,LIMIT
054676  003146                                  BGT     14$
054700  104455                                  TRAP    55                      ;                               7188
054702  000110                                  .WORD   110
054704  013012                                  .WORD   ARR.DAT
054706  026302                                  .WORD   DUMPER
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

054710  012746  010774                          MOV     #WRD.24,-(SP)                   ;                                       7189
054714  012746  011076                          MOV     #WRD.33,-(SP)
054720  012746  010560                          MOV     #WRD.6,-(SP)
054724  012746  011070                          MOV     #WRD.32,-(SP)
054730  012746  011714                          MOV     #PHR.5,-(SP)
054734  012746  011102                          MOV     #WRD.34,-(SP)
054740  012746  010322                          MOV     #SIX.FMT,-(SP)
054744  012746  000007                          MOV     #7,-(SP)
054750  010600                                  MOV     SP,R0                           ; SP,*
054752  104414                                  TRAP    14
054754  000546                                  BR      15$                             ;                                       7190
054756  026602  000002                  11$:    CMP     2(SP),R2                        ; LOW.CNT,HIGH.CNT                      7199
054762  001336                                  BNE     9$
054764  005267  140406                          INC     P.CNT                           ;                                       7201
054770  026767  140402  140402                  CMP     P.CNT,LIMIT
054776  003146                                  BGT     17$
055000  104455                                  TRAP    55                              ;                                       7203
055002  000111                                  .WORD   111
055004  013012                                  .WORD   ARR.DAT
055006  026302                                  .WORD   DUMPER
055010  012746  010774                          MOV     #WRD.24,-(SP)                   ;                                       7204
055014  012746  011076                          MOV     #WRD.33,-(SP)
055020  012746  010560                          MOV     #WRD.6,-(SP)
055024  012746  011070                          MOV     #WRD.32,-(SP)
055030  012746  011714                          MOV     #PHR.5,-(SP)
055034  012746  011102                          MOV     #WRD.34,-(SP)
055040  012746  010322                          MOV     #SIX.FMT,-(SP)
055044  012746  000007                          MOV     #7,-(SP)
055050  010600                                  MOV     SP,R0                           ; SP,*
055052  104414                                  TRAP    14
055054  000546                                  BR      18$                             ;                                       7205
055056  026627  000004  000001          12$:    CMP     4(SP),#1                        ; GTR.FLG,*                             7214
055064  001103                                  BNE     16$
055066  010516                                  MOV     R5,(SP)                         ; *,TEMP                                7217
055070  042716  015777                          BIC     #15777,(SP)                     ; *,TEMP                                7218
055074  021627  162000                          CMP     (SP),#-16000                    ; TEMP,*                                7220
055100  001435                                  BEQ     13$
055102  005267  140270                          INC     P.CNT                           ;                                       7222
055106  026767  140264  140264                  CMP     P.CNT,LIMIT
055114  003153                                  BGT     21$
055116  104455                                  TRAP    55                              ;                                       7224
055120  000112                                  .WORD   112
055122  013012                                  .WORD   ARR.DAT
055124  026302                                  .WORD   DUMPER
055126  012746  010774                          MOV     #WRD.24,-(SP)                   ;                                       7225
055132  012746  011076                          MOV     #WRD.33,-(SP)
055136  012746  010552                          MOV     #WRD.5,-(SP)
055142  012746  011070                          MOV     #WRD.32,-(SP)
055146  012746  011610                          MOV     #PHR.1,-(SP)
055152  012746  011102                          MOV     #WRD.34,-(SP)
055156  012746  010322                          MOV     #SIX.FMT,-(SP)
055162  012746  000007                          MOV     #7,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

055166  010600                                  MOV     SP,R0                   ; SP,*
055170  104414                                  TRAP    14
055172  000477                                  BR      18$                     ;                                       7226
055174  026602  000002                  13$:    CMP     2(SP),R2                ; LOW.CNT,HIGH.CNT                      7231
055200  002100                                  BGE     19$
055202  005267  140170                          INC     P.CNT                   ;                                       7233
055206  026767  140164  140164                  CMP     P.CNT,LIMIT
055214  003113                          14$:    BGT     21$
055216  104455                                  TRAP    55                      ;                                       7235
055220  000113                                  .WORD   113
055222  013012                                  .WORD   ARR.DAT
055224  026302                                  .WORD   DUMPER
055226  012746  010774                          MOV     #WRD.24,-(SP)           ;                                       7236
055232  012746  011076                          MOV     #WRD.33,-(SP)
055236  012746  010552                          MOV     #WRD.5,-(SP)
055242  012746  011070                          MOV     #WRD.32,-(SP)
055246  012746  011610                          MOV     #PHR.1,-(SP)
055252  012746  011102                          MOV     #WRD.34,-(SP)
055256  012746  010322                          MOV     #SIX.FMT,-(SP)
055262  012746  000007                          MOV     #7,-(SP)
055266  010600                                  MOV     SP,R0                   ; SP,*
055270  104414                                  TRAP    14
055272  000437                          15$:    BR      18$                     ;                                       7237
055274  026602  000002                  16$:    CMP     2(SP),R2                ; LOW.CNT,HIGH.CNT                      7246
055300  001440                                  BEQ     19$
055302  005267  140070                          INC     P.CNT                   ;                                       7248
055306  026767  140064  140064                  CMP     P.CNT,LIMIT
055314  003053                          17$:    BGT     21$
055316  104455                                  TRAP    55                      ;                                       7250
055320  000154                                  .WORD   154
055322  013012                                  .WORD   ARR.DAT
055324  026302                                  .WORD   DUMPER
055326  012746  010774                          MOV     #WRD.24,-(SP)           ;                                       7251
055332  012746  011076                          MOV     #WRD.33,-(SP)
055336  012746  010552                          MOV     #WRD.5,-(SP)
055342  012746  011070                          MOV     #WRD.32,-(SP)
055346  012746  011610                          MOV     #PHR.1,-(SP)
055352  012746  011102                          MOV     #WRD.34,-(SP)
055356  012746  010322                          MOV     #SIX.FMT,-(SP)
055362  012746  000007                          MOV     #7,-(SP)
055366  010600                                  MOV     SP,R0                   ; SP,*
055370  104414                                  TRAP    14
055372  012701  000001                  18$:    MOV     #1,R1                   ; *,ERR.FLG                             7252
055376  062706  000020                          ADD     #20,SP                  ;                                       7248
055402  020127  000001                  19$:    CMP     R1,#1                   ; ERR.FLG,*                             7259
055406  001011                                  BNE     20$
055410  010546                                  MOV     R5,-(SP)                ;                                       7262
055412  012746  007002                          MOV     #FMT.7,-(SP)
055416  012746  000002                          MOV     #2,-(SP)
055422  010600                                  MOV     SP,R0                   ; SP,*
055424  104414                                  TRAP    14
055426  062706  000006                          ADD     #6,SP                   ;                                       7261
```

```
15517                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
15518                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
15519
15520 055432  104467                    20$:    TRAP    67                      .                                       7263
15521 055434  006000                            ROR     R0
15522 055436  103002                            BHIS    21$
15523 055440  000167  176666                    JMP     2$
15524 055444  026627  000006  177777    21$:    CMP     6(SP),#-1               ; PROM.DATA,*                           7267
15525 055452  001402                            BEQ     22$
15526 055454  000167  176646                    JMP     1$
15527 055460  062706  000010            22$:    ADD     #10,SP                  ;                                       7095
15528 055464  000207                            RTS     PC
15529
15530                                   ; Routine Size:  313 words
15531                                   ; Maximum stack depth per invocation:  18 words
15536
15537
15541
15542                                           .SBTTL  T26 TEST CODE SECTION
15546 055466                            T26::
15547 055466  004767  176612            1$:     JSR     PC,$T26                 ;                                       7267
15548 055472  104466                            TRAP    66
15549 055474  006000                            ROR     R0
15550 055476  103773                            BLO     1$
15551 055500  000207                            RTS     PC
15552
15553                                   ; Routine Size:  6 words
15554                                   ; Maximum stack depth per invocation:  0 words
15559
15560
15561 ;         7270  !<BLF/PAGE>
```

```
15563 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15564 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (79)
15565 ;
15566 ;          7271  !
15567 ;          7272  !
15568 ;          7273  BGNTST;
15569 ;          7274
15570 ;          7275  !++
15571 ;          7276  ! TEST NUMBER:  TST 27
15572 ;          7277  !
15573 ;          7278  ! TEST NAME:    INITIAL ARRAY TEST
15574 ;          7279  !
15575 ;          7280  ! TEST DESCRIPTION:
15576 ;          7281  !
15577 ;          7282  !       DUE TO THE NATURE OF THE DEVICE
15578 ;          7283  !       THERE EXISTS KNOWN BAD ARRAY
15579 ;          7284  !       DATA LOCATIONS.
15580 ;          7285  !
15581 ;          7286  !       THEREFORE TO INITIALLY TEST THE ARRAYS'
15582 ;          7287  !       TIMING AND CONTROL LOGIC A BAD
15583 ;          7288  !       NIBBLE THRESHOLD OF 36 BAD NIBBLES
15584 ;          7289  !       OUT OF 100 NIBBLES TESTED WILL BE
15585 ;          7290  !       TOLERATED BEFORE DETERMINING CONTROL
15586 ;          7291  !       LOGIC TO BE IN ERROR.
15587 ;          7292  !
15588 ;          7293  !       THE ARRAYS' ARE INITIALLY TESTED BY:
15589 ;          7294  !
15590 ;          7295  !       1.  VIA DAT_DM MOD WRITE DATA PATTERNS
15591 ;          7296  !           OF 1'S AND 0'S TO 5 ARRAY
15592 ;          7297  !           WORDS.
15593 ;          7298  !
15594 ;          7299  !       2.  TEST EACH NIBBLE (4 BITS) FOR
15595 ;          7300  !           1'S AND 0'S AND COUNT EACH BAD
15596 ;          7301  !           NIBBLE ENCOUNTERED.
15597 ;          7302  !
15598 ;          7303  !       3.  IF ACCUMULATED BAD NIBBLES
15599 ;          7304  !           EXCEED 36 THEN REPORT AN ERROR.
15600 ;          7305  !
15601 ;          7306  !--
15602 ;          7307
15603 ;          7308  local
15604 ;          7309      TST_PAT,                              !TEST PATTERN
15605 ;          7310      BAD_NIB_CNT,                          !NUMBER OF BAD NIBBLES FOUND
15606 ;          7311      ERR_FLG;                              !ERROR FLAG
15607 ;          7312
15608 ;          7313  TST_PAT = ONES;
15609 ;          7314  BAD_NIB_CNT = ZEROES;
15610 ;          7315
15611 ;          7316  incr TWICE from 0 to 1 do                 !REPEAT LOOP TWICE
15612 ;          7317      begin
15613 ;          7318      BGNSUB;
15614 ;          7319      CLR_MBUS;
15615 ;          7320      MLD1 = .TST_PAT;                      !LOAD TEST PATTERN INTO DIAG REGISTERS
15616 ;          7321      MLD2 = .TST_PAT;
15617 ;          7322      MLE2 = .TST_PAT;
```

```
15619 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 BLiss-16 V2(212)
15620 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (79)
15621
15622 ;          7323      DAT_DM = ONE;                        !SET DATA DIAG MODE
15623 ;          7324      FIRST_BLK_XFER ();                   !SET UP A FIRST BLK XFERR
15624 ;          7325      MLCS1 = write;                       !DO A MBUS WRITE FUNCTION
15625 ;          7326
15626 ;          7327      incr CNT from 0 to 4 do              !CLOCK 5 WORDS INTO MEMORY
15627 ;          7328          begin
15628 ;          7329          DELAY (ONE_US);
15629 ;          7330          DAT_CLK = ONE;
15630 ;          7331          end;
15631 ;          7332
15632 ;          7333      CLR_MBUS;
15633 ;          7334      DAT_DM = ONE;                        !SET DATA DIAG MODE
15634 ;          7335      FIRST_BLK_XFER ();                   !SET UP A FIRST BLK XFERR
15635 ;          7336      MLCS1 = read;                        !DO A READ FUNCTION
15636 ;          7337      DELAY (ONE_US);
15637 ;          7338
15638 ;          7339      incr ARR_WRD from 0 to 4 do          !READ THE 5 WORD IN MEMORY
15639 ;          7340          begin
15640 ;          7341          DAT_CLK = ONE;                   !CLOCK OUT A WORD INTO THE DIAG REGS
15641 ;          7342          DELAY (ONE_US);
15642 ;          7343          RD_LNG_WRD;                      !READ THE DIAG REGISTERS
15643 ;          7344
15644 ;          7345          incr NIB_PTR from 0 to 9 do      !READ THE 10 NIBBLES IN THE WORD
15645 ;          7346              begin
15646 ;          7347              TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE TST PAT TO NIBBLE UNDER TEST
15647 ;          7348
15648 ;          7349              if .ERR_FLG IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
15649 ;          7350
15650 ;          7351                                           !INCREMENT BAD_NIBBLE COUNT IFERR_FLG SET
15651 ;          7352              end;
15652 ;          7353
15653 ;          7354          end;
15654 ;          7355
15655 ;          7356      TST_PAT = not .TST_PAT;              !REPEAT WITH COMPLIMENT TST PAT
15656 ;          7357      ENDSUB;
15657 ;          7358      end;
15658 ;          7359
15659 ;          7360  if .BAD_NIB_CNT gtr 36                   !SEE IF 36 OUT OF THE 100 XFERRED WHERE BAD
15660 ;          7361  then
15661 ;          7362      begin                                !ERROR IF GTR 36
15662 ;          7363      ERRDF (77, ASYNC, DUMPER);
15663 ;          7364      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, WRD_45, FNC_14);
15664 ;          7365      DODU (.ML_LUN);
15665 ;          7366      DOCLN;
15666 ;          7367      end;
15667 ;          7368
15668 ;          7369  ENDTST;
15672
15673                                  .SBTTL  $T27 TEST CODE SECTION
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

055502  004167  127104                  $T27:   JSR     R1,$SAVE5                       ;                                       7269
055506  024646                                  CMP     -(SP),-(SP)
055510  012701  177777                          MOV     #-1,R1                          ; *,TST.PAT                             7313
055514  005046                                  CLR     -(SP)                           ; BAD.NIB.CNT                           7314
055516  005005                                  CLR     R5                              ; TWICE                                 7316
055520  104402                          1$:     TRAP    2                               ;                                       7317
055522  152777  000040  137714                  BISB    #40,@ML.REG+40                  ;                                       7318
055530  016704  140276                          MOV     ML.DUT,R4
055534  042704  177770                          BIC     #177770,R4
055540  142777  000007  137676                  BICB    #7,@ML.REG+40
055546  150477  137672                          BISB    R4,@ML.REG+40
055552  010177  140016                          MOV     R1,@ML.REG+170                  ; TST.PAT,*                             7320
055556  010177  140022                          MOV     R1,@ML.REG+200                  ; TST.PAT,*                             7321
055562  010177  137776                          MOV     R1,@ML.REG+160                  ; TST.PAT,*                             7322
055566  152777  000010  137730                  BISB    #10,@ML.REG+120                 ;                                       7323
055574  004767  142462                          JSR     PC,FIRST.BLK.XFER               ;                                       7324
055600  012777  000061  137576                  MOV     #61,@ML.REG                     ;                                       7325
055606  005002                                  CLR     R2                              ; CNT                                   7327
055610  012703  000001                  2$:     MOV     #1,R3                           ; *,$$TMP2                              7329
055614  001411                          3$:     BEQ     6$
055616  016704  124274                          MOV     L$DLY,R4                        ; *,$$TMP1
055622  001404                                  BEQ     5$
055624  005066  000004                  4$:     CLR     4(SP)                           ; $$TMP
055630  005304                                  DEC     R4                              ; $$TMP1
055632  001374                                  BNE     4$
055634  005303                          5$:     DEC     R3                              ; $$TMP2
055636  000766                                  BR      3$
055640  152777  000020  137656          6$:     BISB    #20,@ML.REG+120                 ;                                       7330
055646  005202                                  INC     R2                              ; CNT                                   7327
055650  020227  000004                          CMP     R2,#4                           ; CNT,*
055654  003755                                  BLE     2$
055656  152777  000040  137560                  BISB    #40,@ML.REG+40                  ;                                       7331
055664  016704  140142                          MOV     ML.DUT,R4
055670  042704  177770                          BIC     #177770,R4
055674  142777  000007  137542                  BICB    #7,@ML.REG+40
055702  150477  137536                          BISB    R4,@ML.REG+40
055706  152777  000010  137610                  BISB    #10,@ML.REG+120                 ;                                       7334
055714  004767  142342                          JSR     PC,FIRST.BLK.XFER               ;                                       7335
055720  012777  000071  137456                  MOV     #71,@ML.REG                     ;                                       7336
055726  012703  000001                          MOV     #1,R3                           ; *,$$TMP2                              7337
055732  001411                          7$:     BEQ     10$
055734  016704  124156                          MOV     L$DLY,R4                        ; *,$$TMP1
055740  001404                                  BEQ     9$
055742  005066  000004                  8$:     CLR     4(SP)                           ; $$TMP
055746  005304                                  DEC     R4                              ; $$TMP1
055750  001374                                  BNE     8$
055752  005303                          9$:     DEC     R3                              ; $$TMP2
055754  000766                                  BR      7$
055756  005002                          10$:    CLR     R2                              ; ARR.WRD                               7339
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

055760  152777  000020  137536  11$:    BISB    #20,@ML.REG+120                 ;                                       7341
055766  012703  000001                  MOV     #1,R3                           ; *,$$TMP2                              7342
055772  001411                  12$:    BEQ     15$
055774  016704  124116                  MOV     L$DLY,R4                        ; *,$$TMP1
056000  001404                          BEQ     14$
056002  005066  000004          13$:    CLR     4(SP)                           ; $$TMP
056006  005304                          DEC     R4                              ; $$TMP1
056010  001374                          BNE     13$
056012  005303                  14$:    DEC     R3                              ; $$TMP2
056014  000766                          BR      12$
056016  017767  137552  135350  15$:    MOV     @ML.REG+170,D1.TEMP
056024  017767  137554  135344          MOV     @ML.REG+200,D2.TEMP
056032  017767  137526  135340          MOV     @ML.REG+160,E2.TEMP
056040  005004                          CLR     R4                              ; NIB.PTR                               7345
056042  010446                  16$:    MOV     R4,-(SP)                        ; NIB.PTR,*                             7347
056044  010146                          MOV     R1,-(SP)                        ; TST.PAT,*
056046  012746  000010                  MOV     #10,-(SP)
056052  060616                          ADD     SP,(SP)                         ; ERR.FLG,*
056054  004767  142316                  JSR     PC,TST.LNG.WRD
056060  026627  000010  000001          CMP     10(SP),#1                       ; ERR.FLG,*                             7349
056066  001002                          BNE     17$
056070  005266  000006                  INC     6(SP)                           ; BAD.NIB.CNT
056074  062706  000006          17$:    ADD     #6,SP                           ;                                       7346
056100  005204                          INC     R4                              ; NIB.PTR                               7345
056102  020427  000011                  CMP     R4,#11                          ; NIB.PTR,*
056106  003755                          BLE     16$
056110  005202                          INC     R2                              ; ARR.WRD                               7339
056112  020227  000004                  CMP     R2,#4                           ; ARR.WRD,*
056116  003720                          BLE     11$
056120  005101                          COM     R1                              ; TST.PAT                               7356
056122  104467                          TRAP    67
056124  006000                          ROR     R0
056126  103002                          BHIS    19$
056130  000167  177364          18$:    JMP     1$
056134  005205                  19$:    INC     R5                              ; TWICE                                 7316
056136  020527  000001                  CMP     R5,#1                           ; TWICE,*
056142  003772                          BLE     18$
056144  021627  000044                  CMP     (SP),#44                        ; BAD.NIB.CNT,*                         7360
056150  003432                          BLE     20$
056152  104455                          TRAP    55                              ;                                       7363
056154  000115                          .WORD   115
056156  012706                          .WORD   ASYNC
056160  026302                          .WORD   DUMPER
056162  012746  012344                  MOV     #FNC.14,-(SP)                   ;                                       7364
056166  012746  011214                  MOV     #WRD.45,-(SP)
056172  012746  010650                  MOV     #WRD.12,-(SP)
056176  012746  011676                  MOV     #PHR.4,-(SP)
056202  012746  010752                  MOV     #WRD.22,-(SP)
056206  012746  010304                  MOV     #FIV.FMT,-(SP)
056212  012746  000006                  MOV     #6,-(SP)
056216  010600                          MOV     SP,R0                           ; SP,*
056220  104414                          TRAP    14
```

29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

```
15787                                   ;ML4AD
15788                                   ;               TEST CODE SECTION
15789                                                                                   7365
15790 056222  016700  137602                      MOV     ML.LUN,R0                 ;
15791 056226  104451                              TRAP    51
15792 056230  104444                              TRAP    44
15793 056232  062706  000016                      ADD     #16,SP                    ;    7362
15794 056236  062706  000006              20$:    ADD     #6,SP                     ;    7269
15795 056242  000207                              RTS     PC
15796
15797                                   ; Routine Size:  177 words
15798                                   ; Maximum stack depth per invocation:  16 words
15803
15804
15808
15809                                             .SBTTL  T27 TEST CODE SECTION
15813 056244                            T27::
15814 056244  004767  177232              1$:     JSR     PC,$T27                   ;    7367
15815 056250  104466                              TRAP    66
15816 056252  006000                              ROR     R0
15817 056254  103773                              BLO     1$
15818 056256  000207                              RTS     PC
15819
15820                                   ; Routine Size:  6 words
15821                                   ; Maximum stack depth per invocation:  0 words
15826
15827
15828 ;          7370  !<BLF/PAGE>
```

```
15830 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15831 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)
15832
15833 ;          7371  !
15834 ;          7372  BGNTST;
15835 ;          7373
15836 ;          7374  !++
15837 ;          7375  ! TEST NUMBER:  TST 28
15838 ;          7376  !
15839 ;          7377  ! TEST NAME:    PROM SELECTION TEST
15840 ;          7378  !
15841 ;          7379  ! TEST DESCRIPTION:
15842 ;          7380  !       DUE TO THE NATURE OF THE DEVICE
15843 ;          7381  !       AND OF THE ARRAY MODULES' UV
15844 ;          7382  !       PROMS, ONLY PROM READS ARE
15845 ;          7383  !       ALLOWED DURING DIAG TESTING.
15846 ;          7384  !
15847 ;          7385  !       THEREFORE THE ARRAY MODULE UV PROMS
15848 ;          7386  !       ARE TESTED FOR UNIQUE SELECTION BY:
15849 ;          7387  !
15850 ;          7388  !       1.  AT EACH PRESENT ARRAY MODULE WRITE 127 ARRAY WORDS WITH 1'S/0'S PATTERN.
15851 ;          7389  !
15852 ;          7390  !       2.  READ THE UV PROMS AT THEIR RESPECTIVE ARRAY WORD LOCATION AND SEE IF
15853 ;          7391  !           THE PROMS MASK BAD NIBBLE LOCATIONS (ENCOUNTERED BAD NIBBLES
15854 ;          7392  !           INDICATES INCORRECT MASKING).  COUNT EACH BAD NIBBLE ENCOUNTERED AT AN
15855 ;          7393  !           ARRAY MODULE.
15856 ;          7394  !
15857 ;          7395  !       3.  ALLOW A THRESHOLD OF 5 BAD NIBBLES AT ANY ARRAY MODULE.
15858 ;          7396  !
15859 ;          7397  !       4.  REPORT PROM SEL ERRORS AT RESPECTIVE ARRAY MODULE IF THE
15860 ;          7398  !           THRESHOLD IS EXCEEDED.
15861 ;          7399  !
15862 ;          7400  ! IMPLICIT INPUTS:
15863 ;          7401  !       PD_TEMP:
15864 ;          7402  !       A BIT VECTOR OF 16 BITS WHERE
15865 ;          7403  !       THE READ PROM DATA IS STORED
15866 ;          7404  !       AND ACCESSED FROM.
15867 ;          7405  !
15868 ;          7406  !       IO_BUF
15869 ;          7407  !       A VECTOR OF 256 WORDS WHERE
15870 ;          7408  !       DATA FOR MBUS READS AND WRITE
15871 ;          7409  !       FUNCTION ARE FOUND.
15872 ;          7410  !
15873 ;          7411  !--
15874 ;          7412
15875 ;          7413  local
15876 ;          7414      DODU_FLG,                          !DROP UNIT FLG
15877 ;          7415      ERR_FLG,                           !ERROR FLG
15878 ;          7416      TST_PAT,                           !TEST PATTERN
15879 ;          7417      ERR_CNT;                           !ERROR COUNT
15880 ;          7418
15881 ;          7419  DODU_FLG = ZERO;
15882 ;          7420  TST_PAT = ONES;
15883 ;          7421
15884 ;          7422  !
```

```
15886 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15887 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)
15888 ;
15889 ;          7423   !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
15890 ;          7424   !
15891 ;          7425   incrU ARR_SEL from 0 to .LST_ARR by .ARR_INC do         !TEST ALL PRESENT ARRAYS
15892 ;          7426       begin
15893 ;          7427       ERR_CNT = ZERO;
15894 ;          7428       BGNSUB;
15895 ;          7429
15896 ;          7430       incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
15897 ;          7431           begin
15898 ;          7432           CLR_MBUS;
15899 ;          7433           MLD1 = .TST_PAT;                        !LOAD DATA DIAG REGISTERS WITH TST_PAT
15900 ;          7434           MLD2 = .TST_PAT;
15901 ;          7435           MLE2 = .TST_PAT;
15902 ;          7436           DAT_DM = ONE;                           !SET DATA DIAG MODE
15903 ;          7437           MLWC = not 255;                         !LOAD WORD COUNT
15904 ;          7438           MLBA = IO_BUF;                          !LOAD UBUS ADRS
15905 ;          7439           MLDA = .ARR_SEL;                        !LOAD SECTOR
15906 ;          7440           MLCS1 = write;                          !DO A WRITE FUNCTION
15907 ;          7441
15908 ;          7442           incr CNT from 0 to 127 do               !CLOCK IN 127 WORDS
15909 ;          7443               begin
15910 ;          7444               DELAY (ONE_US);
15911 ;          7445               DAT_CLK = ONE;
15912 ;          7446               end;
15913 ;          7447
15914 ;          7448           CLR_MBUS;
15915 ;          7449           DAT_DM = ONE;                           !SET DATA DIAG MODE
15916 ;          7450           MLWC = not 255;                         !LOAD WORD COUNT
15917 ;          7451           MLBA = IO_BUF;                          !LOAD UBUS ADRS
15918 ;          7452           MLDA = .ARR_SEL;                        !LOAD SECTOR
15919 ;          7453           MLCS1 = read;                           !DO A READ FUNCTION
15920 ;          7454           DELAY (ONE_US);
15921 ;          7455
15922 ;          7456           incr WD_CNT from 0 to 127 do            !READ THE 10 WORDS
15923 ;          7457               begin
15924 ;          7458               PD_TEMP = .MLPD;                    !GET PROM DATA FOR THIS WORD
15925 ;          7459               DAT_CLK = ONE;                      !CLOCK THIS WORD INTO DIAG REG
15926 ;          7460               DELAY (ONE_US);
15927 ;          7461               RD_LNG_WRD;                         !READ DIAG REG FOR THIS WORD
15928 ;          7462
15929 ;          7463               incr NIB_PTR from 0 to 9 do         !LOOK AT ALL 10 NIBBLE
15930 ;          7464
15931 ;          7465                   if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !FIND GOOD NIBBLES
15932 ;          7466                   then
15933 ;          7467                       begin
15934 ;          7468                       TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE NIBBLE TO TST_PAT
15935 ;          7469
15936 ;          7470                       if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1;
15937 ;          7471
15938 ;          7472                                                   !INCREMENT ERROR COUNT IF ERROR FLG IS SET
15939 ;          7473                       end;
15940 ;          7474
```

```
15942 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
15943 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)
15944 ;
15945 ;          7475              end;
15946 ;          7476
15947 ;          7477          TST_PAT = not .TST_PAT;          !REPEAT WITH COMPLIMENT DATA
15948 ;          7478          end;
15949 ;          7479
15950 ;          7480      if .ERR_CNT gtr 5                    !ALLOW 5 ERROR BEFORE ERRORING
15951 ;          7481      then
15952 ;          7482          begin                            !ERROR IF GTR 5
15953 ;          7483          ERRDF (78, ARR_DAT, DUMPER);
15954 ;          7484          PRINTB (THR_FMT, WRD_35, WRD_37, WRD_10);
15955 ;          7485          PRINTB (FMT_9, .ARR_SEL);
15956 ;          7486          DODU_FLG = ONE;
15957 ;          7487          end;
15958 ;          7488
15959 ;          7489      ENDSUB;
15960 ;          7490
15961 ;          7491      if .DODU_FLG IS_SET                  !DROP THIS UNIT IF DODU_FLG IS SET
15962 ;          7492      then
15963 ;          7493          begin
15964 ;          7494          DODU (.ML_LUN);
15965 ;          7495          DOCLN;
15966 ;          7496          end;
15967 ;          7497
15968 ;          7498      end;
15969 ;          7499
15970 ;          7500  ENDTST;
15974
15975                                          .SBTTL  $T28 TEST CODE SECTION
15979 056260  004167  126326          $T28:   JSR     R1,$SAVE5                ;                          7369
15980 056264  162706  000016                  SUB     #16,SP
15981 056270  005066  000010                  CLR     10(SP)                   ; DODU.FLG                 7419
15982 056274  012702  177777                  MOV     #-1,R2                   ; *,TST.PAT                7420
15983 056300  016766  135514  000006          MOV     LST.ARR,6(SP)            ;                          7425
15984 056306  016766  135472  000004          MOV     ARR.INC,4(SP)
15985 056314  005001                          CLR     R1                       ; ARR.SEL
15986 056316  000167  000666                  JMP     25$
15987 056322  005066  000002          1$:     CLR     2(SP)                    ; ERR.CNT                  7427
15988 056326  104402                  2$:     TRAP    2
15989 056330  005016                          CLR     (SP)                     ; TWICE                    7430
15990 056332  152777  000040  137104  3$:     BISB    #40,@ML.REG+40           ;                          7431
15991 056340  016705  137466                  MOV     ML.DUT,R5
15992 056344  042705  177770                  BIC     #177770,R5
15993 056350  142777  000007  137066          BICB    #7,@ML.REG+40
15994 056356  150577  137062                  BISB    R5,@ML.REG+40
15995 056362  010277  137206                  MOV     R2,@ML.REG+170           ; TST.PAT,*                7433
15996 056366  010277  137212                  MOV     R2,@ML.REG+200           ; TST.PAT,*                7434
```

```
15998                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
15999                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
16000
16001 056372 010277 137166              MOV     R2,@ML.REG+160          ; TST.PAT,*                             7435
16002 056376 152777 000010 137120       BISB    #10,@ML.REG+120         ;                                       7436
16003 056404 012777 177400 137002       MOV     #-400,@ML.REG+10        ;                                       7437
16004 056412 012777 014022 137004       MOV     #IO.BUF,@ML.REG+20      ;                                       7438
16005 056420 010177 137010              MOV     R1,@ML.REG+30           ; ARR.SEL,*                             7439
16006 056424 012777 000061 136752       MOV     #61,@ML.REG             ;                                       7440
16007 056432 005003                     CLR     R3                      ; CNT                                   7442
16008 056434 012704 000001      4$:     MOV     #1,R4                   ; *,$$TMP2                              7444
16009 056440 001411             5$:     BEQ     8$
16010 056442 016705 123450              MOV     L$DLY,R5                ; *,$$TMP1
16011 056446 001404                     BEQ     7$
16012 056450 005066 000014      6$:     CLR     14(SP)                  ; $$TMP
16013 056454 005305                     DEC     R5                      ; $$TMP1
16014 056456 001374                     BNE     6$
16015 056460 005304             7$:     DEC     R4                      ; $$TMP2
16016 056462 000766                     BR      5$
16017 056464 152777 000020 137032 8$:   BISB    #20,@ML.REG+120         ;                                       7445
16018 056472 005203                     INC     R3                      ; CNT                                   7442
16019 056474 020327 000177              CMP     R3,#177                 ; CNT,*
16020 056500 003755                     BLE     4$
16021 056502 152777 000040 136734       BISB    #40,@ML.REG+40          ;                                       7446
16022 056510 016705 137316              MOV     ML.DUT,R5
16023 056514 042705 177770              BIC     #177770,R5
16024 056520 142777 000007 136716       BICB    #7,@ML.REG+40
16025 056526 150577 136712              BISB    R5,@ML.REG+40
16026 056532 152777 000010 136764       BISB    #10,@ML.REG+120         ;                                       7449
16027 056540 012777 177400 136646       MOV     #-400,@ML.REG+10        ;                                       7450
16028 056546 012777 014022 136650       MOV     #IO.BUF,@ML.REG+20      ;                                       7451
16029 056554 010177 136654              MOV     R1,@ML.REG+30           ; ARR.SEL,*                             7452
16030 056560 012777 000071 136616       MOV     #71,@ML.REG             ;                                       7453
16031 056566 012704 000001              MOV     #1,R4                   ; *,$$TMP2                              7454
16032 056572 001411             9$:     BEQ     12$
16033 056574 016705 123316              MOV     L$DLY,R5                ; *,$$TMP1
16034 056600 001404                     BEQ     11$
16035 056602 005066 000014      10$:    CLR     14(SP)                  ; $$TMP
16036 056606 005305                     DEC     R5                      ; $$TMP1
16037 056610 001374                     BNE     10$
16038 056612 005304             11$:    DEC     R4                      ; $$TMP2
16039 056614 000766                     BR      9$
16040 056616 005003             12$:    CLR     R3                      ; WD.CNT                                7456
16041 056620 017767 137010 136514 13$:  MOV     @ML.REG+230,PD.TEMP     ;                                       7458
16042 056626 152777 000020 136670       BISB    #20,@ML.REG+120         ;                                       7459
16043 056634 012704 000001              MOV     #1,R4                   ; *,$$TMP2                              7460
16044 056640 001411             14$:    BEQ     17$
16045 056642 016705 123250              MOV     L$DLY,R5                ; *,$$TMP1
16046 056646 001404                     BEQ     16$
16047 056650 005066 000014      15$:    CLR     14(SP)                  ; $$TMP
16048 056654 005305                     DEC     R5                      ; $$TMP1
16049 056656 001374                     BNE     15$
16050 056660 005304             16$:    DEC     R4                      ; $$TMP2
16051 056662 000766                     BR      14$
16052 056664 017767 136704 134502 17$:  MOV     @ML.REG+170,D1.TEMP
```

```
16054                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
16055                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
16056
16057 056672  017767  136706  134476            MOV     @ML.REG+200,D2.TEMP
16058 056700  017767  136660  134472            MOV     @ML.REG+160,E2.TEMP
16059 056706  005004                            CLR     R4                      ; NIB.PTR                       7463
16060 056710  010405                    18$:    MOV     R4,R5                   ; NIB.PTR,*                     7465
16061 056712  006205                            ASR     R5
16062 056714  006205                            ASR     R5
16063 056716  006205                            ASR     R5
16064 056720  062705  015342                    ADD     #PD.TEMP,R5
16065 056724  010546                            MOV     R5,-(SP)
16066 056726  010446                            MOV     R4,-(SP)                ; NIB.PTR,*
16067 056730  042716  177770                    BIC     #177770,(SP)
16068 056734  012746  000001                    MOV     #1,-(SP)
16069 056740  005046                            CLR     -(SP)
16070 056742  004767  124666                    JSR     PC,BL$GT2
16071 056746  062706  000010                    ADD     #10,SP
16072 056752  005700                            TST     R0
16073 056754  001017                            BNE     20$
16074 056756  010446                            MOV     R4,-(SP)                ; NIB.PTR,*                     7468
16075 056760  010246                            MOV     R2,-(SP)                ; TST.PAT,*
16076 056762  012746  000020                    MOV     #20,-(SP)
16077 056766  060616                            ADD     SP,(SP)                 ; ERR.FLG,*
16078 056770  004767  141402                    JSR     PC,TST.LNG.WRD
16079 056774  026627  000020  000001            CMP     20(SP),#1               ; ERR.FLG,*                     7470
16080 057002  001002                            BNE     19$
16081 057004  005266  000010                    INC     10(SP)                  ; ERR.CNT
16082 057010  062706  000006            19$:    ADD     #6,SP                   ;                               7467
16083 057014  005204                    20$:    INC     R4                      ; NIB.PTR                       7463
16084 057016  020427  000011                    CMP     R4,#11                  ; NIB.PTR,*
16085 057022  003732                            BLE     18$
16086 057024  005203                            INC     R3                      ; WD.CNT                        7456
16087 057026  020327  000177                    CMP     R3,#177                 ; WD.CNT,*
16088 057032  003672                            BLE     13$
16089 057034  005102                            COM     R2                      ; TST.PAT                       7477
16090 057036  005216                            INC     (SP)                    ; TWICE                         7430
16091 057040  021627  000001                    CMP     (SP),#1                 ; TWICE,*
16092 057044  003002                            BGT     21$
16093 057046  000167  177260                    JMP     3$
16094 057052  026627  000002  000005    21$:    CMP     2(SP),#5                ; ERR.CNT,*                     7480
16095 057060  003434                            BLE     22$
16096 057062  104455                            TRAP    55                      ;                               7483
16097 057064  000116                            .WORD   116
16098 057066  013012                            .WORD   ARR.DAT
16099 057070  026302                            .WORD   DUMPER
16100 057072  012746  010630                    MOV     #WRD.10,-(SP)           ;                               7484
16101 057076  012746  011122                    MOV     #WRD.37,-(SP)
16102 057102  012746  011110                    MOV     #WRD.35,-(SP)
16103 057106  012746  010256                    MOV     #THR.FMT,-(SP)
16104 057112  012746  000004                    MOV     #4,-(SP)
16105 057116  010600                            MOV     SP,R0                   ; SP,*
16106 057120  104414                            TRAP    14
16107 057122  010116                            MOV     R1,(SP)                 ; ARR.SEL,*                     7485
16108 057124  012746  007064                    MOV     #FMT.9,-(SP)
```

```
16110                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
16111                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
16112
16113 057130  012746  000002                     MOV     #2,-(SP)
16114 057134  010600                             MOV     SP,R0                   ; SP,*
16115 057136  104414                             TRAP    14
16116 057140  012766  000001  000026             MOV     #1,26(SP)               ; *,DODU.FLG                            7486
16117 057146  062706  000016                     ADD     #16,SP                  ;                                       7482
16118 057152  104467                   22$:      TRAP    67                      ;                                       7487
16119 057154  006000                             ROR     R0
16120 057156  103002                             BHIS    23$
16121 057160  000167  177142                     JMP     2$
16122 057164  026627  000010  000001   23$:      CMP     10(SP),#1               ; DODU.FLG,*                            7491
16123 057172  001004                             BNE     24$
16124 057174  016700  136630                     MOV     ML.LUN,R0               ;                                       7494
16125 057200  104451                             TRAP    51
16126 057202  104444                             TRAP    44
16127 057204  066601  000004             24$:    ADD     4(SP),R1                ; *,ARR.SEL                             7425
16128 057210  020166  000006             25$:    CMP     R1,6(SP)                ; ARR.SEL,*
16129 057214  101002                             BHI     26$
16130 057216  000167  177100                     JMP     1$
16131 057222  062706  000016             26$:    ADD     #16,SP                  ;                                       7369
16132 057226  000207                             RTS     PC
16133
16134                                   ; Routine Size:  244 words
16135                                   ; Maximum stack depth per invocation:  20 words
16140
16141
16145
16146                                           .SBTTL  T28 TEST CODE SECTION
16150 057230                            T28::
16151 057230  004767  177024             1$:     JSR     PC,$T28                 ;                                       7498
16152 057234  104466                             TRAP    66
16153 057236  006000                             ROR     R0
16154 057240  103773                             BLO     1$
16155 057242  000207                             RTS     PC
16156
16157                                   ; Routine Size:  6 words
16158                                   ; Maximum stack depth per invocation:  0 words
16163
16164 ;         7501  !<BLF/PAGE>
```

```
16166 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16167 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
16168
16169 ;          7502  !
16170 ;          7503  BGNTST;
16171 ;          7504
16172 ;          7505  !++
16173 ;          7506  ! TEST NUMBER:  TST 29
16174 ;          7507  !
16175 ;          7508  ! TEST NAME:    READ WRITE ARRAYS WITH PROM DATA
16176 ;          7509  !
16177 ;          7510  ! TEST DESCRIPTION:
16178 ;          7511  !       COMBINE THE READING OF ARRAY
16179 ;          7512  !       MODULE DATA WITH ARRAY MODULE UV PROM DATA AND
16180 ;          7513  !       FIND A GOOD BLOCK WHERE FURTHER
16181 ;          7514  !       TESTING WILL BE PERFORMED BY:
16182 ;          7515  !
16183 ;          7516  !       1.  STARTING AT BLOCK 0 WRITE THE BLOCK WITH SELECTED DATA PATTERNS
16184 ;          7517  !           AND READ THE BLOCK AVOIDING ANY BAD NIBBLES POINTED TO BY THE
16185 ;          7518  !           PROM DATA.
16186 ;          7519  !
16187 ;          7520  !           SET ERROR FLAG IF ANY BAD NIBBLES ARE ENCOUNTERED IN BLOCK.
16188 ;          7521  !
16189 ;          7522  !       2.  REPEAT WRITING/READING THIS BLOCK UNTIL ALL PATTERNS ARE TESTED
16190 ;          7523  !           OR THE ERROR FLAG IS SET.
16191 ;          7524  !
16192 ;          7525  !       3.  IF ALL PATTERN HAVE BEEN TESTED AND THE ERROR FLAG IS NOT SET
16193 ;          7526  !           THEN SAVE THIS BLOCK ADDRESS AS THE GOOD BLOCK ADRS AND EXIT TEST.
16194 ;          7527  !
16195 ;          7528  !       4.  ELSE IF THE ERROR FLG HAS SET THEN REPEAT TEST AT THE NEXT ROW.
16196 ;          7529  !           REPEAT UNTIL A GOOD BLOCK IS FOUND OR LAST ROW IS REACHED.
16197 ;          7530  !
16198 ;          7531  !       5.  IF NO GOOD BLOCK IS FOUND BY LAST ROW THEN REPORT ERROR AND
16199 ;          7532  !           EXIT TEST.
16200 ;          7533  !
16201 ;          7534  ! IMPLICIT INPUTS:
16202 ;          7535  !       RAS_INC
16203 ;          7536  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE ROW ADDRESS
16204 ;          7537  !       INCREMENT VALUE FOR THIS DRIVE.
16205 ;          7538  !
16206 ;          7539  !
16207 ;          7540  !       PD_TEMP:
16208 ;          7541  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
16209 ;          7542  !       ACCESSED FROM.
16210 ;          7543  !
16211 ;          7544  !       IO_BUF:
16212 ;          7545  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION
16213 ;          7546  !       ARE FOUND.
16214 ;          7547  !
16215 ;          7548  !
16216 ;          7549  !--
16217 ;          7550
16218 ;          7551  local
16219 ;          7552      WRD_CNT,                              !WORD COUNT
16220 ;          7553      NIB_PTR,                              !NIBBLE POINTER
```

```
16222 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16223 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
16224 ;
16225 ;          7554      PASS_CNT,                            !PASS COUNT
16226 ;          7555      NIB_PAT,                             !NIBBLE PATTERN
16227 ;          7556      DONE_FLG,                            !DONE FLAG
16228 ;          7557      ERR_FLG,                             !ERROR FLAG
16229 ;          7558      SECTOR_NO;                           !SECTOR NUMBER
16230 ;          7559
16231 ;          7560  BGNSUB;
16232 ;          7561  PASS_CNT = -1;
16233 ;          7562  SECTOR_NO = ZEROES;
16234 ;          7563  DONE_FLG = ZERO;
16235 ;          7564
16236 ;          7565  do                                       !THIS LOOP DETERMINES WHEN TO STOP
16237 ;          7566      begin
16238 ;          7567
16239 ;          7568      do                                   !THIS LOOP RUNS THE PATTERNS
16240 ;          7569          begin
16241 ;          7570          PASS_CNT = .PASS_CNT + 1;        !INCREMENT THE PASS COUNT
16242 ;          7571          CLR_MBUS;
16243 ;          7572          DAT_DM = ONE;                    !SET DATA DIAG MODE
16244 ;          7573          MLDA = .SECTOR_NO;               !LOAD SECTOR NUMBER IN DSA
16245 ;          7574          MLWC = not 255;                  !LOAD WORD COUNT
16246 ;          7575          MLBA = IO_BUF;                   !LOAD UBUS ADRS
16247 ;          7576
16248 ;          7577          case .PASS_CNT from 0 to 3 of    !SELECT A NIBBLE PATTERN
16249 ;          7578              set
16250 ;          7579
16251 ;          7580              [0] :
16252 ;          7581                  NIB_PAT = %o'000000';    !ZEROES
16253 ;          7582
16254 ;          7583              [1] :
16255 ;          7584                  NIB_PAT = %o'17';        !ONES
16256 ;          7585
16257 ;          7586              [2] :
16258 ;          7587                  NIB_PAT = %o'12';        !ALTERNATING ONE'S, ZEROES
16259 ;          7588
16260 ;          7589              [3] :
16261 ;          7590                  NIB_PAT = %o'15'         !COMPLIMENT ONE'S, ZEROES
16262 ;          7591              tes;
16263 ;          7592
16264 ;          7593          incr LD_CNT from 0 to 9 do       !LOAD NIBBLE PATTERN INTO NIBBLE SAVE
16265 ;          7594              LD_LNG_WRD (.LD_CNT, .NIB_PAT);
16266 ;          7595
16267 ;          7596          WRT_LNG_WRD;                     !LOAD THE DATA DIAG REGISTERS WITH NIBBLE SAVE
16268 ;          7597          MLCS1 = write;                   !DO A WRITE FUNCTION
16269 ;          7598
16270 ;          7599          incr WRT_CNT from 0 to 127 do    !WRITE PATTERN INTO THIS BLOCK
16271 ;          7600              begin
16272 ;          7601              DELAY (ONE_US);
16273 ;          7602              DAT_CLK = ONE;
16274 ;          7603              end;
16275 ;          7604
16276 ;          7605          CLR_MBUS;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
;
;          7606          DAT_DM = ONE;                    !SET DATA DIAG MODE
;          7607          MLDA = .SECTOR_NO;               !LOAD SECTOR NUMBER
;          7608          MLWC = not 255;                  !LOAD WORD COUNT
;          7609          MLBA = IO_BUF;                   !LOAD UBUS ADRS
;          7610          MLCS1 = read;                    !DO A READ FUNCTION
;          7611          DELAY (ONE_US);
;          7612          WRD_CNT = -1;                    !RESET THE WORD COUNT
;          7613
;          7614          do
;          7615              begin                        !TEST ONE BLOCK FOR NIBBLE PATTERN
;          7616              WRD_CNT = .WRD_CNT + 1;
;          7617              PD_TEMP = .MLPD;             !GET PROM DATA
;          7618              DAT_CLK = ONE;               !CLOCK DATA WORD INTO DIAG REG
;          7619              DELAY (ONE_US);              !
;          7620              RD_LNG_WRD;                  !READ DIAG REGISTERS
;          7621              NIB_PTR = -1;                !RESET THE NIBBLE POINTER
;          7622
;          7623              do
;          7624                  begin                    !SEARCH FOR GOOD NIBBLES
;          7625                  NIB_PTR = .NIB_PTR + 1;  !INCREMENT NIBBLE POINTER
;          7626
;          7627                  if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !TEST THIS NIB IF PROM FLAG NOT SET
;          7628                  then
;          7629                      TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);
;          7630
;          7631                  end
;          7632              until (.ERR_FLG) or (.NIB_PTR eql 9);
;          7633
;          7634              end
;          7635          until (.ERR_FLG) or (.WRD_CNT eql 127);
;          7636
;          7637          end
;          7638      until (.PASS_CNT eql 3) or (.ERR_FLG IS_SET );      !REPEAT UNTIL ALL PAT TESTED OR ERROR FLG GETS SET
;          7639
;          7640      if (.PASS_CNT eql 3) and (.ERR_FLG IS_NOT_SET )     !WAS THIS A GOOD BLOCK?
;          7641      then
;          7642          begin                            !YES
;          7643          DONE_FLG = ONE;                  !SET DONE FLAG
;          7644          GOOD_BLK = .SECTOR_NO;           !GOOD BLOCK GETS THIS SECTOR NO
;          7645          end
;          7646      else
;          7647          begin                            !NO
;          7648          SECTOR_NO = .SECTOR_NO + .RAS_INC;       !INCREMENT ROW NO
;          7649          PASS_CNT = -1;                   !RESET PASS COUNT
;          7650          end;
;          7651
;          7652      end
;          7653  !
;          7654  !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;          7655  !
;          7656  until (.DONE_FLG IS_SET ) or (.SECTOR_NO eqlU .LST_ARR + .ARR_INC);
;          7657
```

```
16334 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16335 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
16336 ;
16337 ;          7658                                          !REPEAT UNTIL GOOD BLK FOUND OR AT LST ROW
16338 ;          7659  ENDSUB;
16339 ;          7660
16340 ;          7661  !
16341 ;          7662  !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
16342 ;          7663  !
16343 ;          7664  if .SECTOR_NO eqlU .LST_ARR + .ARR_INC        !SEE IF WE'RE AT THE LAST BLOCK
16344 ;          7665  then
16345 ;          7666      begin                                     !A GOOD BLK NOT FOUND BEFORE LAST BLK
16346 ;          7667      ERRDF (79, INTER, DUMPER);                !ERROR AND DROP UNIT
16347 ;          7668      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
16348 ;          7669      DODU (.ML_LUN);
16349 ;          7670      DOCLN;
16350 ;          7671      end;
16351 ;          7672
16352 ;          7673  ENDTST;
16356
16357                                        .SBTTL  $T29 TEST CODE SECTION
16361 057244  004167  125342          $T29:  JSR     R1,$SAVE5                ;                              7500
16362 057250  162706  000014                 SUB     #14,SP
16363 057254  104402                  1$:    TRAP    2                        ;                              7558
16364 057256  012766  177777  000002        MOV     #-1,2(SP)                ; *,PASS.CNT                   7561
16365 057264  005002                        CLR     R2                       ; SECTOR.NO                    7562
16366 057266  005066  000004                CLR     4(SP)                    ; DONE.FLG                     7563
16367 057272  005266  000002          2$:   INC     2(SP)                    ; PASS.CNT                     7570
16368 057276  152777  000040  136140        BISB    #40,@ML.REG+40
16369 057304  016705  136522                MOV     ML.DUT,R5
16370 057310  042705  177770                BIC     #177770,R5
16371 057314  142777  000007  136122        BICB    #7,@ML.REG+40
16372 057322  150577  136116                BISB    R5,@ML.REG+40
16373 057326  152777  000010  136170        BISB    #10,@ML.REG+120          ;                              7572
16374 057334  010277  136074                MOV     R2,@ML.REG+30            ; SECTOR.NO,*                  7573
16375 057340  012777  177400  136046        MOV     #-400,@ML.REG+10         ;                              7574
16376 057346  012777  014022  136050        MOV     #IO.BUF,@ML.REG+20       ;                              7575
16377 057354  016605  000002                MOV     2(SP),R5                 ; PASS.CNT,*                   7577
16378 057360  006305                        ASL     R5
16379 057362  066507  057366                ADD     3$(R5),PC
16380 057366  000010                  3$:   .WORD   4$-3$
16381 057370  000014                        .WORD   5$-3$
16382 057372  000022                        .WORD   6$-3$
16383 057374  000030                        .WORD   7$-3$
16384 057376  005001                  4$:   CLR     R1                       ; NIB.PAT                      7581
16385 057400  000410                        BR      8$                       ;                              7577
16386 057402  012701  000017          5$:   MOV     #17,R1                   ; *,NIB.PAT                    7584
16387 057406  000405                        BR      8$                       ;                              7577
16388 057410  012701  000012          6$:   MOV     #12,R1                   ; *,NIB.PAT                    7587
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

057414  000402                                  BR      8$                      ;                                       7577
057416  012701  000015                  7$:     MOV     #15,R1                  ; *,NIB.PAT                             7590
057422  005005                          8$:     CLR     R5                      ; LD.CNT                                7593
057424  010546                          9$:     MOV     R5,-(SP)                ; LD.CNT,*                              7594
057426  010146                                  MOV     R1,-(SP)                ; NIB.PAT,*
057430  004767  141720                          JSR     PC,LD.LNG.WRD
057434  022626                                  CMP     (SP)+,(SP)+
057436  005205                                  INC     R5                      ; LD.CNT                                7593
057440  020527  000011                          CMP     R5,#11                  ; LD.CNT,*
057444  003767                                  BLE     9$
057446  016777  133722  136120                  MOV     D1.TEMP,@ML.REG+170     ;                                       7594
057454  016777  133716  136122                  MOV     D2.TEMP,@ML.REG+200
057462  016777  133712  136074                  MOV     E2.TEMP,@ML.REG+160
057470  012777  000061  135706                  MOV     #61,@ML.REG             ;                                       7597
057476  005003                                  CLR     R3                      ; WRT.CNT                               7599
057500  012704  000001                  10$:    MOV     #1,R4                   ; *,$$TMP2                              7601
057504  001411                          11$:    BEQ     14$
057506  016705  122404                          MOV     L$DLY,R5                ; *,$$TMP1
057512  001404                                  BEQ     13$
057514  005066  000012                  12$:    CLR     12(SP)                  ; $$TMP
057520  005305                                  DEC     R5                      ; $$TMP1
057522  001374                                  BNE     12$
057524  005304                          13$:    DEC     R4                      ; $$TMP2
057526  000766                                  BR      11$
057530  152777  000020  135766          14$:    BISB    #20,@ML.REG+120         ;                                       7602
057536  005203                                  INC     R3                      ; WRT.CNT                               7599
057540  020327  000177                          CMP     R3,#177                 ; WRT.CNT,*
057544  003755                                  BLE     10$
057546  152777  000040  135670                  BISB    #40,@ML.REG+40          ;                                       7603
057554  016705  136252                          MOV     ML.DUT,R5
057560  042705  177770                          BIC     #177770,R5
057564  142777  000007  135652                  BICB    #7,@ML.REG+40
057572  150577  135646                          BISB    R5,@ML.REG+40
057576  152777  000010  135720                  BISB    #10,@ML.REG+120         ;                                       7606
057604  010277  135524                          MOV     R2,@ML.REG+30           ; SECTOR.NO,*                           7607
057610  012777  177400  135576                  MOV     #-400,@ML.REG+10        ;                                       7608
057616  012777  014022  135600                  MOV     #IO.BUF,@ML.REG+20      ;                                       7609
057624  012777  000071  135552                  MOV     #71,@ML.REG             ;                                       7610
057632  012704  000001                          MOV     #1,R4                   ; *,$$TMP2                              7611
057636  001411                          15$:    BEQ     18$
057640  016705  122252                          MOV     L$DLY,R5                ; *,$$TMP1
057644  001404                                  BEQ     17$
057646  005066  000012                  16$:    CLR     12(SP)                  ; $$TMP
057652  005305                                  DEC     R5                      ; $$TMP1
057654  001374                                  BNE     16$
057656  005304                          17$:    DEC     R4                      ; $$TMP2
057660  000766                                  BR      15$
057662  012766  177777  000006          18$:    MOV     #-1,6(SP)               ; *,WRD.CNT                             7612
057670  005266  000006                  19$:    INC     6(SP)                   ; WRD.CNT                               7616
057674  017767  135734  135440                  MOV     @ML.REG+230,PD.TEMP     ;                                       7617
057702  152777  000020  135614                  BISB    #20,@ML.REG+120         ;                                       7618
057710  012704  000001                          MOV     #1,R4                   ; *,$$TMP2                              7619
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

057714  001411                          20$:    BEQ     23$
057716  016705  122174                          MOV     L$DLY,R5                        ; *,$$TMP1
057722  001404                                  BEQ     22$
057724  005066  000012                  21$:    CLR     12(SP)                          ; $$TMP
057730  005305                                  DEC     R5                              ; $$TMP1
057732  001374                                  BNE     21$
057734  005304                          22$:    DEC     R4                              ; $$TMP2
057736  000766                                  BR      20$
057740  017767  135630  133426          23$:    MOV     @ML.REG+170,D1.TEMP
057746  017767  135632  133422                  MOV     @ML.REG+200,D2.TEMP
057754  017767  135604  133416                  MOV     @ML.REG+160,E2.TEMP
057762  012716  177777                          MOV     #-1,(SP)                        ; *,NIB.PTR                     7621
057766  005216                          24$:    INC     (SP)                            ; NIB.PTR                       7625
057770  011605                                  MOV     (SP),R5                         ; NIB.PTR,*                     7627
057772  006205                                  ASR     R5
057774  006205                                  ASR     R5
057776  006205                                  ASR     R5
060000  062705  015342                          ADD     #PD.TEMP,R5
060004  010546                                  MOV     R5,-(SP)
060006  016646  000002                          MOV     2(SP),-(SP)                     ; NIB.PTR,*
060012  042716  177770                          BIC     #177770,(SP)
060016  012746  000001                          MOV     #1,-(SP)
060022  005046                                  CLR     -(SP)
060024  004767  123604                          JSR     PC,BL$GT2
060030  062706  000010                          ADD     #10,SP
060034  005700                                  TST     R0
060036  001011                                  BNE     25$
060040  011646                                  MOV     (SP),-(SP)                      ; NIB.PTR,*                     7629
060042  010146                                  MOV     R1,-(SP)                        ; NIB.PAT,*
060044  012746  000016                          MOV     #16,-(SP)
060050  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
060052  004767  140320                          JSR     PC,TST.LNG.WRD
060056  062706  000006                          ADD     #6,SP
060062  016605  000010                  25$:    MOV     10(SP),R5                       ; ERR.FLG,*                     7632
060066  032705  000001                          BIT     #1,R5
060072  001012                                  BNE     26$
060074  021627  000011                          CMP     (SP),#11                        ; NIB.PTR,*
060100  001332                                  BNE     24$
060102  032705  000001                          BIT     #1,R5                           ;                               7635
060106  001004                                  BNE     26$
060110  026627  000006  000177                  CMP     6(SP),#177                      ; WRD.CNT,*
060116  001264                                  BNE     19$
060120  005004                          26$:    CLR     R4                              ;                               7638
060122  026627  000002  000003                  CMP     2(SP),#3                        ; PASS.CNT,*
060130  001002                                  BNE     27$
060132  005204                                  INC     R4
060134  000403                                  BR      28$
060136  020527  000001                  27$:    CMP     R5,#1
060142  001030                                  BNE     31$
060144  006004                          28$:    ROR     R4                              ;                               7640
060146  103010                                  BCC     29$
060150  005705                                  TST     R5
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

060152  001006                                  BNE     29$
060154  012766  000001  000004                  MOV     #1,4(SP)                        ; *,DONE.FLG                    7643
060162  010267  133620                          MOV     R2,GOOD.BLK                     ; SECTOR.NO,*                   7644
060166  000405                                  BR      30$                             ;                               7640
060170  066702  135152                  29$:    ADD     RAS.INC,R2                      ; *,SECTOR.NO                   7648
060174  012766  177777  000002                  MOV     #-1,2(SP)                       ; *,PASS.CNT                    7649
060202  026627  000004  000001          30$:    CMP     4(SP),#1                        ; DONE.FLG,*                    7656
060210  001410                                  BEQ     32$
060212  016705  133602                          MOV     LST.ARR,R5
060216  066705  133562                          ADD     ARR.INC,R5
060222  020205                                  CMP     R2,R5                           ; SECTOR.NO,*
060224  001402                          31$:    BEQ     32$
060226  000167  177040                          JMP     2$
060232  104467                          32$:    TRAP    67
060234  006000                                  ROR     R0
060236  103002                                  BHIS    33$
060240  000167  177010                          JMP     1$
060244  016705  133550                  33$:    MOV     LST.ARR,R5                      ;                               7664
060250  066705  133530                          ADD     ARR.INC,R5
060254  020205                                  CMP     R2,R5                           ; SECTOR.NO,*
060256  001026                                  BNE     34$
060260  104455                                  TRAP    55                              ;                               7667
060262  000117                                  .WORD   117
060264  013114                                  .WORD   INTER
060266  026302                                  .WORD   DUMPER
060270  012746  012360                          MOV     #FNC.15,-(SP)                   ;                               7668
060274  012746  012006                          MOV     #PHR.10,-(SP)
060300  012746  010664                          MOV     #WRD.14,-(SP)
060304  012746  010256                          MOV     #THR.FMT,-(SP)
060310  012746  000004                          MOV     #4,-(SP)
060314  010600                                  MOV     SP,R0                           ; SP,*
060316  104414                                  TRAP    14
060320  016700  135504                          MOV     ML.LUN,R0                       ;                               7669
060324  104451                                  TRAP    51
060326  104444                                  TRAP    44
060330  062706  000012                          ADD     #12,SP                          ;                               7666
060334  062706  000014                  34$:    ADD     #14,SP                          ;                               7500
060340  000207                                  RTS     PC

                                        ; Routine Size:  287 words
                                        ; Maximum stack depth per invocation:  17 words



                                                .SBTTL  T29 TEST CODE SECTION
```

```
16558                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
16559                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
16560
16564 060342                            T29::
16565 060342  004767  176676           1$:     JSR     PC,$T29                 ;                       7671
16566 060346  104466                           TRAP    66
16567 060350  006000                           ROR     R0
16568 060352  103773                           BLO     1$
16569 060354  000207                           RTS     PC
16570
16571                                   ; Routine Size:  6 words
16572                                   ; Maximum stack depth per invocation:  0 words
16577
16578
16579 ;         7674  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (82)

;                !
;                !
;                BGNTST;
;
;                !++
;                ! TEST NUMBER:  TST 30
;                !
;                ! TEST NAME:    REFRESH TIMING TEST
;                !
;                ! TEST DESCRIPTION:
;                !
;                !       TEST THE MEMORY ARRAY MODULES
;                !       REFRESH TIMING AND CONTROL LOGIC
;                !       REG BY:
;                !
;                !       1.  WRITING ALL ONES INTO THE
;                !           GOOD BLOCK.
;                !
;                !       2.  DELAY FOR 2 MS
;                !
;                !       3.  READ THE GOOD BLOCK FOR ONES.
;                !           KEEP COUNT OF BAD NIBBLES
;                !           ENCOUNTERED
;                !
;                !       4.  ALLOW A BAD NIBBLE THRESHOLD
;                !           OF 20 BAD NIBBLES OUT OF THE
;                !           1280 NIBBLES TESTED.
;                !
;                !       5.  IF THRESHOLD IS EXCEEDED THEN
;                !           REPORT ERROR AND DROP THE UNIT.
;                !
;                ! IMPLICIT INPUTS:
;                !
;                !       PD_TEMP:
;                !       A BIT VECTOR OF 16 BITS WHERE
;                !       THE READ PROM DATA IS STORED
;                !       AND ACCESSED FROM.
;                !
;                !--
;
;                local
;                    TST_PAT,                                !TEST PATTERN
;                    ERR_CNT,                                !ERROR COUNT
;                    ERR_FLG;                                !ERROR FLAG
;
;                BGNSUB;
;                CLR_MBUS;
;                ERR_CNT = ZERO;
;                TST_PAT = ONES;
;                MLD1 = .TST_PAT;                            !LOAD DATA DIAG REGS WITH TST PAT
;                MLD2 = .TST_PAT;
;                MLE2 = .TST_PAT;
```

```
16637 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16638 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (82)
16639
16640 ;          7727  DAT_DM_XFER ();                         !SET UP A DATA DIAG MODE XFERR
16641 ;          7728  MLCS1 = write;                          !DO A WRITE FUNCTION
16642 ;          7729
16643 ;          7730  incr WRD_CNT from 0 to 127 do           !WRITE BLOCK WITH TST PAT
16644 ;          7731      begin
16645 ;          7732      DELAY (ONE_US);
16646 ;          7733      DAT_CLK = ONE;
16647 ;          7734      end;
16648 ;          7735
16649 ;          7736  CLR_MBUS;
16650 ;          7737  DAT_DM_XFER ();                         !SET UP A DATA DIAG MODE XFERR
16651 ;          7738  MLCS1 = read;                           !DO A READ FUNCTION
16652 ;          7739  DELAY (TWO_TH_US);                      !DELAY FOR 2 MS
16653 ;          7740
16654 ;          7741  incr WRD_CNT from 0 to 127 do           !READ THE BLOCK
16655 ;          7742      begin
16656 ;          7743      PD_TEMP = .MLPD;                    !GET THE PROM DATA
16657 ;          7744      DAT_CLK = ONE;                      !CLOCK DATA WORD INTO DIAG REG
16658 ;          7745      DELAY (ONE_US);
16659 ;          7746      RD_LNG_WRD;                         !READ THE DIAG REG
16660 ;          7747
16661 ;          7748      incr NIB_PTR from 0 to 9 do         !LOOK AT 10 NIBBLES
16662 ;          7749          begin
16663 ;          7750
16664 ;          7751          if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);
16665 ;          7752
16666 ;          7753                                              !FIND GOOD NIBBLES AND COMPARE THEM
16667 ;          7754
16668 ;          7755          if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INCREMENT ERROR COUNT IF ERR_FLG IS SET
16669 ;          7756
16670 ;          7757          end;
16671 ;          7758
16672 ;          7759      end;
16673 ;          7760
16674 ;          7761  ENDSUB;
16675 ;          7762
16676 ;          7763  if .ERR_CNT gtr 20                       !ALLOW 20 NIBBLES TO FAIL
16677 ;          7764  then
16678 ;          7765      begin                                 !ERROR IF GTR 20
16679 ;          7766      ERRDF (80, ASYNC, DUMPER);
16680 ;          7767      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, FNC_16, WRD_48);
16681 ;          7768      DODU (.ML_LUN);
16682 ;          7769      DOCLN;
16683 ;          7770      end;
16684 ;          7771
16685 ;          7772  ENDTST;
16689
16690                                  .SBTTL  $T30 TEST CODE SECTION
```

```
060356  004167  124230          $T30:   JSR     R1,$SAVE5                       ;                                   7673
060362  024646                          CMP     -(SP),-(SP)
060364  104402                  1$:     TRAP    2                               ;                                   7718
060366  152777  000040  135050          BISB    #40,@ML.REG+40                  ;                                   7720
060374  016703  135432                  MOV     ML.DUT,R3
060400  042703  177770                  BIC     #177770,R3
060404  142777  000007  135032          BICB    #7,@ML.REG+40
060412  150377  135026                  BISB    R3,@ML.REG+40
060416  005005                          CLR     R5                              ; ERR.CNT                           7722
060420  012704  177777                  MOV     #-1,R4                          ; *,TST.PAT                         7723
060424  010477  135144                  MOV     R4,@ML.REG+170                  ; TST.PAT,*                         7724
060430  010477  135150                  MOV     R4,@ML.REG+200                  ; TST.PAT,*                         7725
060434  010477  135124                  MOV     R4,@ML.REG+160                  ; TST.PAT,*                         7726
060440  004767  135746                  JSR     PC,DAT.DM.XFER                  ;                                   7727
060444  012777  000061  134732          MOV     #61,@ML.REG                     ;                                   7728
060452  005001                          CLR     R1                              ; WRD.CNT                           7730
060454  012702  000001          2$:     MOV     #1,R2                           ; *,$$TMP2                          7732
060460  001411                  3$:     BEQ     6$
060462  016703  121430                  MOV     L$DLY,R3                        ; *,$$TMP1
060466  001404                          BEQ     5$
060470  005066  000002          4$:     CLR     2(SP)                           ; $$TMP
060474  005303                          DEC     R3                              ; $$TMP1
060476  001374                          BNE     4$
060500  005302                  5$:     DEC     R2                              ; $$TMP2
060502  000766                          BR      3$
060504  152777  000020  135012  6$:     BISB    #20,@ML.REG+120                 ;                                   7733
060512  005201                          INC     R1                              ; WRD.CNT                           7730
060514  020127  000177                  CMP     R1,#177                         ; WRD.CNT,*
060520  003755                          BLE     2$
060522  152777  000040  134714          BISB    #40,@ML.REG+40                  ;                                   7734
060530  016703  135276                  MOV     ML.DUT,R3
060534  042703  177770                  BIC     #177770,R3
060540  142777  000007  134676          BICB    #7,@ML.REG+40
060546  150377  134672                  BISB    R3,@ML.REG+40
060552  004767  135634                  JSR     PC,DAT.DM.XFER                  ;                                   7737
060556  012777  000071  134620          MOV     #71,@ML.REG                     ;                                   7738
060564  012702  003720                  MOV     #3720,R2                        ; *,$$TMP2                          7739
060570  001411                  7$:     BEQ     10$
060572  016703  121320                  MOV     L$DLY,R3                        ; *,$$TMP1
060576  001404                          BEQ     9$
060600  005066  000002          8$:     CLR     2(SP)                           ; $$TMP
060604  005303                          DEC     R3                              ; $$TMP1
060606  001374                          BNE     8$
060610  005302                  9$:     DEC     R2                              ; $$TMP2
060612  000766                          BR      7$
060614  005001                  10$:    CLR     R1                              ; WRD.CNT                           7741
060616  017767  135012  134516  11$:    MOV     @ML.REG+230,PD.TEMP             ;                                   7743
060624  152777  000020  134672          BISB    #20,@ML.REG+120                 ;                                   7744
060632  012702  000001                  MOV     #1,R2                           ; *,$$TMP2                          7745
060636  001411                  12$:    BEQ     15$
```

```
16749                                   ;ML4AD
16750                                   ;               TEST CODE SECTION
16751
16752 060640 016703 121252                      MOV     L$DLY,R3        ; *,$$TMP1
16753 060644 001404                             BEQ     14$
16754 060646 005066 000002              13$:    CLR     2(SP)           ; $$TMP
16755 060652 005303                             DEC     R3              ; $$TMP1
16756 060654 001374                             BNE     13$
16757 060656 005302                     14$:    DEC     R2              ; $$TMP2
16758 060660 000766                             BR      12$
16759 060662 017767 134706 132504       15$:    MOV     @ML.REG+170,D1.TEMP
16760 060670 017767 134710 132500               MOV     @ML.REG+200,D2.TEMP
16761 060676 017767 134662 132474               MOV     @ML.REG+160,E2.TEMP
16762 060704 005002                             CLR     R2              ; NIB.PTR                       7748
16763 060706 010203                     16$:    MOV     R2,R3           ; NIB.PTR,*                     7751
16764 060710 006203                             ASR     R3
16765 060712 006203                             ASR     R3
16766 060714 006203                             ASR     R3
16767 060716 062703 015342                      ADD     #PD.TEMP,R3
16768 060722 010346                             MOV     R3,-(SP)
16769 060724 010246                             MOV     R2,-(SP)        ; NIB.PTR,*
16770 060726 042716 177770                      BIC     #177770,(SP)
16771 060732 012746 000001                      MOV     #1,-(SP)
16772 060736 005046                             CLR     -(SP)
16773 060740 004767 122670                      JSR     PC,BL$GT2
16774 060744 062706 000010                      ADD     #10,SP
16775 060750 005700                             TST     R0
16776 060752 001011                             BNE     17$
16777 060754 010246                             MOV     R2,-(SP)        ; NIB.PTR,*
16778 060756 010446                             MOV     R4,-(SP)        ; TST.PAT,*
16779 060760 012746 000006                      MOV     #6,-(SP)
16780 060764 060616                             ADD     SP,(SP)         ; ERR.FLG,*
16781 060766 004767 137404                      JSR     PC,TST.LNG.WRD
16782 060772 062706 000006                      ADD     #6,SP
16783 060776 021627 000001              17$:    CMP     (SP),#1         ; ERR.FLG,*                     7755
16784 061002 001001                             BNE     18$
16785 061004 005205                             INC     R5              ; ERR.CNT
16786 061006 005202                     18$:    INC     R2              ; NIB.PTR                       7748
16787 061010 020227 000011                      CMP     R2,#11          ; NIB.PTR,*
16788 061014 003734                             BLE     16$
16789 061016 005201                             INC     R1              ; WRD.CNT                       7741
16790 061020 020127 000177                      CMP     R1,#177         ; WRD.CNT,*
16791 061024 003674                             BLE     11$
16792 061026 104467                             TRAP    67              ;                               7759
16793 061030 006000                             ROR     R0
16794 061032 103002                             BHIS    19$
16795 061034 000167 177324                      JMP     1$
16796 061040 020527 000024              19$:    CMP     R5,#24          ; ERR.CNT,*                     7763
16797 061044 003432                             BLE     20$
16798 061046 104455                             TRAP    55              ;                               7766
16799 061050 000120                             .WORD   120
16800 061052 012706                             .WORD   ASYNC
16801 061054 026302                             .WORD   DUMPER
16802 061056 012746 011250                      MOV     #WRD.48.,-(SP)  ;                               7767
16803 061062 012746 012372                      MOV     #FNC.16.,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

061066  012746  010650                          MOV     #WRD.12,-(SP)
061072  012746  011676                          MOV     #PHR.4,-(SP)
061076  012746  010752                          MOV     #WRD.22,-(SP)
061102  012746  010304                          MOV     #FIV.FMT,-(SP)
061106  012746  000006                          MOV     #6,-(SP)
061112  010600                                  MOV     SP,R0                           ; SP,*
061114  104414                                  TRAP    14
061116  016700  134706                          MOV     ML.LUN,R0                       ;                                       7768
061122  104451                                  TRAP    51
061124  104444                                  TRAP    44
061126  062706  000016                          ADD     #16,SP                          ;                                       7765
061132  022626                          20$:    CMP     (SP)+,(SP)+                     ;                                       7673
061134  000207                                  RTS     PC

                                        ; Routine Size:  184 words
                                        ; Maximum stack depth per invocation:  15 words



                                                .SBTTL  T30 TEST CODE SECTION
061136                                  T30::
061136  004767  177214                  1$:     JSR     PC,$T30                         ;                                       7770
061142  104466                                  TRAP    66
061144  006000                                  ROR     R0
061146  103773                                  BLO     1$
061150  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          7773  !<BLF/PAGE>
```

```
16855 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16856 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
16857 ;
16858 ;          7774  !
16859 ;          7775  BGNTST;
16860 ;          7776
16861 ;          7777  !++
16862 ;          7778  ! TEST NUMBER:  TST 31
16863 ;          7779  !
16864 ;          7780  ! TEST NAME:    ADDRESS COUNTER TEST
16865 ;          7781  !
16866 ;          7782  ! TEST DESCRIPTION:
16867 ;          7783  !       TEST THE ABILITY OF THE ADDRESS
16868 ;          7784  !       COUNTER TO SUCCESSFULLY COUNT
16869 ;          7785  !       FROM BLOCK ZERO THROUGH THE
16870 ;          7786  !       DEVICES LAST BLOCK BY:
16871 ;          7787  !
16872 ;          7788  !       1.  WRITING THE LAST BLOCK WITH ONES PATTERN.
16873 ;          7789  !
16874 ;          7790  !       2.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK UP TO THE
16875 ;          7791  !           LAST BLOCK ADRS MINUS ONE.
16876 ;          7792  !
16877 ;          7793  !           READ THE LAST BLOCK FOR ONES AND ERROR IF ZEROES.
16878 ;          7794  !
16879 ;          7795  !       3.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK THROUGH THE LAST
16880 ;          7796  !           BLOCK.
16881 ;          7797  !
16882 ;          7798  !           READ THE LAST BLOCK FOR ZEROES AND ERROR IF STILL ONES.
16883 ;          7799  !
16884 ;          7800  ! IMPLICIT INPUTS:
16885 ;          7801  !       PD_TEMP:
16886 ;          7802  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
16887 ;          7803  !--
16888 ;          7804
16889 ;          7805  local
16890 ;          7806      ERR_CNT,                              !ERROR THRESHOLD COUNT
16891 ;          7807      ERR_FLG,                              !ERROR FLG
16892 ;          7808      END_CNT,                              !ENDING SECTOR NUMBER
16893 ;          7809      BG_PAT;                               !BACKGROUND PATTERN
16894 ;          7810
16895 ;          7811  BGNSUB;
16896 ;          7812  CLR_MBUS;
16897 ;          7813  BG_PAT = ONES;                            !BACKGROUND PAT OF ONES
16898 ;          7814  MLD1 = .BG_PAT;                           !LOAD DATA DIAGS WITH BG PAT
16899 ;          7815  MLD2 = .BG_PAT;
16900 ;          7816  MLE2 = .BG_PAT;
16901 ;          7817  DAT_DM = ONE;                             !SET DATA DIAG MODE
16902 ;          7818  LAST_BLK_XFER ();                         !SET UP A LAST BLOCK XFERR
16903 ;          7819  MLCST = write;                            !DO A WRITE FUNCTION
16904 ;          7820
16905 ;          7821  incr WRD_CNT from 0 to 127 do             !WRITE THE LAST BLOCK WITH THE BG PATTERN
16906 ;          7822      begin
16907 ;          7823      DELAY (ONE_US);
16908 ;          7824      DAT_CLK = ONE;
16909 ;          7825      end;
```

```
16911 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16912 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
16913 ;
16914 ;         7826
16915 ;         7827  CLR_MBUS;
16916 ;         7828  DAT_DM = ONE;                             !SET DATA DIAG MODE
16917 ;         7829  LAST_BLK_XFER ();                         !SET UP A LAST BLOCK XFERR
16918 ;         7830  MLCST = read;                             !DO A READ FUNCTION
16919 ;         7831  DELAY (ONE_US);
16920 ;         7832  ERR_CNT = ZERO;                           !CLEAR ERROR COUNT THRESHOLD
16921 ;         7833
16922 ;         7834  incr WD_CNT from 0 to 127 do              !READ THE LAST BLOCK FOR BG PATTERN
16923 ;         7835      begin
16924 ;         7836      PD_TEMP = .MLPD;                      !GET PROM DATA
16925 ;         7837      DAT_CLK = ONE;                        !CLOCK OUT THE DATA WORD
16926 ;         7838      DELAY (ONE_US);
16927 ;         7839      RD_LNG_WRD;                           !READ THE DATA WORD
16928 ;         7840
16929 ;         7841      incr NIB_PTR from 0 to 9 do           !LOOK AT 10 NIBBLES
16930 ;         7842          begin
16931 ;         7843
16932 ;         7844          if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
16933 ;         7845
16934 ;         7846                                                !FIND GOOD NIBBLES AND COMPARE THEM
16935 ;         7847
16936 ;         7848          if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INC ERROR COUNT IF ERROR DETECTED
16937 ;         7849
16938 ;         7850          end;
16939 ;         7851
16940 ;         7852      end;
16941 ;         7853
16942 ;         7854  if .ERR_CNT gtr 10                         !IS ERROR THRESHOLD EXCEEDED
16943 ;         7855  then
16944 ;         7856      begin                                 !ERROR IF EXCEEDED
16945 ;         7857      ERRDF (81, INTER, DUMPER);
16946 ;         7858      PRINTB (THR_FMT, PHR_4, WRD_13, FNC_22);
16947 ;         7859      PRINTB (TWO_FMT, FNC_13, WRD_56);
16948 ;         7860      EXIT_TST;
16949 ;         7861      end;
16950 ;         7862
16951 ;         7863  END_CNT = .LST_BLK - 1;                   !END AT LAST BLOCK -1
16952 ;         7864  MLDT = ZEROES;                            !LOAD DATA DIAG REG WITH COMP BG PAT
16953 ;         7865  MLD2 = ZEROES;
16954 ;         7866  MLE2 = ZEROES;
16955 ;         7867
16956 ;         7868  incr TWICE from 0 to 1 do                 !REPEAT LOOP TWICE
16957 ;         7869      begin
16958 ;         7870      CLR_MBUS;
16959 ;         7871      ERR_CNT = ZERO;                       !CLEAR THE ERROR COUNT THRESHOLD
16960 ;         7872      DAT_DM = ONE;                         !SET DATA DIAG MODE
16961 ;         7873      FIRST_BLK_XFER ();                    !SET UP A FIRST BLOCK XFERR
16962 ;         7874      MLCS1 = write;                        !DO A WRITE FUNCTION
16963 ;         7875
16964 ;         7876  !
16965 ;         7877  !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
```

```
16967 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16968 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
16969
16970 ;          7878  !
16971 ;          7879      incrU BLK_CNT from 0 to .END_CNT do              !CLOCK THE ADDRESS COUNTER UP TO END_CNT
16972 ;          7880
16973 ;          7881          incr ADRS_CNT from 0 to 127 do
16974 ;          7882              begin
16975 ;          7883              DAT_CLK = ONE;
16976 ;          7884              end;
16977 ;          7885
16978 ;          7886      CLR_MBUS;
16979 ;          7887      DAT_DM = ONE;                                !SET DATA DIAG MODE
16980 ;          7888      LAST_BLK_XFER ();                            !SET UP A LAST BLOCK XFERR
16981 ;          7889      MLCST = read;                                !DO A READ FUNCTION
16982 ;          7890      DELAY (ONE_US);
16983 ;          7891
16984 ;          7892      incr WD_CNT from 0 to 127 do                 !READ THE LAST BLOCK FOR BG PATTERN
16985 ;          7893          begin
16986 ;          7894          PD_TEMP = .MLPD;                         !GET THE PROM DATA
16987 ;          7895          DAT_CLK = ONE;                           !CLOCK OUT DATA WORD
16988 ;          7896          DELAY (ONE_US);
16989 ;          7897          RD_LNG_WRD;                              !READ DATA WORD
16990 ;          7898
16991 ;          7899          incr NIB_PTR from 0 to 9 do              !LOOK AT 10 NIBBLES
16992 ;          7900              begin
16993 ;          7901
16994 ;          7902              if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
16995 ;          7903
16996 ;          7904                                                   !FIND GOOD NIBBLES AND COMPARE THEM
16997 ;          7905
16998 ;          7906              if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + ONE;   !INC ERROR COUNT IF ERROR DECTED
16999 ;          7907
17000 ;          7908              end;
17001 ;          7909
17002 ;          7910          end;
17003 ;          7911
17004 ;          7912      if .ERR_CNT gtr 10                           !IS ERROR COUNT THRESHOLD EXCEEDED
17005 ;          7913      then
17006 ;          7914          begin                                    !ERROR IF EXCEEDED
17007 ;          7915          ERRDF (82, ASYNC, DUMPER);
17008 ;          7916          PRINTB (THR_FMT, WRD_50, WRD_51, WRD_10);
17009 ;          7917          end;
17010 ;          7918
17011 ;          7919      END_CNT = .END_CNT + 1;                      !NOW END AT THE LAST BLOCK
17012 ;          7920      BG_PAT = not .BG_PAT;                        !COMPLIMENT THE BG PATTERN AND REPEAT
17013 ;          7921      end;
17014 ;          7922
17015 ;          7923  ENDSUB;
17016 ;          7924  ENDTST;
17020
17021                                  .SBTTL  $T31 TEST CODE SECTION
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

061152  004167  123434                  $T31:   JSR     R1,$SAVE5                       ;                                       7772
061156  162706  000010                          SUB     #10,SP
061162  104402                          1$:     TRAP    2                               ;                                       7809
061164  152777  000040  134252                  BISB    #40,@ML.REG+40                  ;                                       7811
061172  016705  134634                          MOV     ML.DUT,R5
061176  042705  177770                          BIC     #177770,R5
061202  142777  000007  134234                  BICB    #7,@ML.REG+40
061210  150577  134230                          BISB    R5,@ML.REG+40
061214  012701  177777                          MOV     #-1,R1                          ; *,BG.PAT                              7813
061220  010177  134350                          MOV     R1,@ML.REG+170                  ; BG.PAT,*                              7814
061224  010177  134354                          MOV     R1,@ML.REG+200                  ; BG.PAT,*                              7815
061230  010177  134330                          MOV     R1,@ML.REG+160                  ; BG.PAT,*                              7816
061234  152777  000010  134262                  BISB    #10,@ML.REG+120                 ;                                       7817
061242  004767  137076                          JSR     PC,LAST.BLK.XFER                ;                                       7818
061246  012777  000061  134130                  MOV     #61,@ML.REG                     ;                                       7819
061254  005002                                  CLR     R2                              ; WRD.CNT                               7821
061256  012703  000001                  2$:     MOV     #1,R3                           ; *,$$TMP2                              7823
061262  001411                          3$:     BEQ     6$
061264  016704  120626                          MOV     L$DLY,R4                        ; *,$$TMP1
061270  001404                                  BEQ     5$
061272  005066  000006                  4$:     CLR     6(SP)                           ; $$TMP
061276  005304                                  DEC     R4                              ; $$TMP1
061300  001374                                  BNE     4$
061302  005303                          5$:     DEC     R3                              ; $$TMP2
061304  000766                                  BR      3$
061306  152777  000020  134210          6$:     BISB    #20,@ML.REG+120                 ;                                       7824
061314  005202                                  INC     R2                              ; WRD.CNT                               7821
061316  020227  000177                          CMP     R2,#177                         ; WRD.CNT,*
061322  003755                                  BLE     2$
061324  152777  000040  134112                  BISB    #40,@ML.REG+40                  ;                                       7825
061332  016705  134474                          MOV     ML.DUT,R5
061336  042705  177770                          BIC     #177770,R5
061342  142777  000007  134074                  BICB    #7,@ML.REG+40
061350  150577  134070                          BISB    R5,@ML.REG+40
061354  152777  000010  134142                  BISB    #10,@ML.REG+120                 ;                                       7828
061362  004767  136756                          JSR     PC,LAST.BLK.XFER                ;                                       7829
061366  012777  000071  134010                  MOV     #71,@ML.REG                     ;                                       7830
061374  012703  000001                          MOV     #1,R3                           ; *,$$TMP2                              7831
061400  001411                          7$:     BEQ     10$
061402  016704  120510                          MOV     L$DLY,R4                        ; *,$$TMP1
061406  001404                                  BEQ     9$
061410  005066  000006                  8$:     CLR     6(SP)                           ; $$TMP
061414  005304                                  DEC     R4                              ; $$TMP1
061416  001374                                  BNE     8$
061420  005303                          9$:     DEC     R3                              ; $$TMP2
061422  000766                                  BR      7$
061424  005016                          10$:    CLR     (SP)                            ; ERR.CNT                               7832
061426  005002                                  CLR     R2                              ; WD.CNT                                7834
061430  017767  134200  133704          11$:    MOV     @ML.REG+230,PD.TEMP             ;                                       7836
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

061436  152777  000020  13406C                  BISB    #20,@ML.REG+120                 ;                                       7837
061444  012703  000001                          MOV     #1,R3                           ; *,$$TMP2                              7838
061450  001411                          12$:    BEQ     15$
061452  016704  120440                          MOV     L$DLY,R4                        ; *,$$TMP1
061456  001404                                  BEQ     14$
061460  005066  000006                  13$:    CLR     6(SP)                           ; $$TMP
061464  005304                                  DEC     R4                              ; $$TMP1
061466  001374                                  BNE     13$
061470  005303                          14$:    DEC     R3                              ; $$TMP2
061472  000766                                  BR      12$
061474  017767  134074  131672          15$:    MOV     @ML.REG+170,D1.TEMP
061502  017767  134076  131666                  MOV     @ML.REG+200,D2.TEMP
061510  017767  134050  131662                  MOV     @ML.REG+160,E2.TEMP
061516  005004                                  CLR     R4                              ; NIB.PTR                               7841
061520  010403                          16$:    MOV     R4,R3                           ; NIB.PTR,*                             7844
061522  006203                                  ASR     R3
061524  006203                                  ASR     R3
061526  006203                                  ASR     R3
061530  062703  015342                          ADD     #PD.TEMP,R3
061534  010346                                  MOV     R3,-(SP)
061536  010446                                  MOV     R4,-(SP)                        ; NIB.PTR,*
061540  042716  177770                          BIC     #177770,(SP)
061544  012746  000001                          MOV     #1,-(SP)
061550  005046                                  CLR     -(SP)
061552  004767  122056                          JSR     PC,BL$GT2
061556  062706  000010                          ADD     #10,SP
061562  005700                                  TST     R0
061564  001011                                  BNE     17$
061566  010446                                  MOV     R4,-(SP)                        ; NIB.PTR,*
061570  010146                                  MOV     R1,-(SP)                        ; BG.PAT,*
061572  012746  000012                          MOV     #12,-(SP)
061576  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
061600  004767  136572                          JSR     PC,TST.LNG.WRD
061604  062706  000006                          ADD     #6,SP
061610  026627  000004  000001          17$:    CMP     4(SP),#1                        ; ERR.FLG,*                             7848
061616  001001                                  BNE     18$
061620  005216                                  INC     (SP)                            ; ERR.CNT
061622  005204                          18$:    INC     R4                              ; NIB.PTR                               7841
061624  020427  000011                          CMP     R4,#11                          ; NIB.PTR,*
061630  003733                                  BLE     16$
061632  005202                                  INC     R2                              ; WD.CNT                                7834
061634  020227  000177                          CMP     R2,#177                         ; WD.CNT,*
061640  003673                                  BLE     11$
061642  021627  000012                          CMP     (SP),#12                        ; ERR.CNT,*                             7854
061646  003437                                  BLE     19$
061650  104455                                  TRAP    55                              ;                                       7857
061652  000121                                  .WORD   121
061654  013114                                  .WORD   INTER
061656  026302                                  .WORD   DUMPER
061660  012746  012452                          MOV     #FNC.22,-(SP)                   ;                                       7858
061664  012746  010660                          MOV     #WRD.13,-(SP)
061670  012746  011676                          MOV     #PHR.4,-(SP)
```

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17135                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
17136                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
17137
17138 061674  012746  010256                    MOV     #THR.FMT,-(SP)
17139 061700  012746  000004                    MOV     #4,-(SP)
17140 061704  010600                            MOV     SP,R0           ; SP,*
17141 061706  104414                            TRAP    14
17142 061710  012716  011344                    MOV     #WRD.56,(SP)    ;                                       7859
17143 061714  012746  012334                    MOV     #FNC.13,-(SP)
17144 061720  012746  010246                    MOV     #TWO.FMT,-(SP)
17145 061724  012746  000003                    MOV     #3,-(SP)
17146 061730  010600                            MOV     SP,R0           ; SP,*
17147 061732  104414                            TRAP    14
17148 061734  104463                            TRAP    63
17149 061736  062706  000020                    ADD     #20,SP          ;                                       7854
17150 061742  000167  000560                    JMP     38$             ;                                       7856
17151 061746  016766  132042  000002  19$:      MOV     LST.BLK,2(SP)   ; *,END.CNT                             7863
17152 061754  005366  000002                    DEC     2(SP)           ; END.CNT
17153 061760  005077  133610                    CLR     @ML.REG+170     ;                                       7864
17154 061764  005077  133614                    CLR     @ML.REG+200     ;                                       7865
17155 061770  005077  133570                    CLR     @ML.REG+160     ;                                       7866
17156 061774  005005                            CLR     R5              ; TWICE                                 7868
17157 061776  152777  000040  133440  20$:      BISB    #40,@ML.REG+40  ;                                       7869
17158 062004  016704  134022                    MOV     ML.DUT,R4
17159 062010  042704  177770                    BIC     #177770,R4
17160 062014  142777  000007  133422            BICB    #7,@ML.REG+40
17161 062022  150477  133416                    BISB    R4,@ML.REG+40
17162 062026  005016                            CLR     (SP)            ; ERR.CNT                               7871
17163 062030  152777  000010  133466            BISB    #10,@ML.REG+120 ;                                       7872
17164 062036  004767  136220                    JSR     PC,FIRST.BLK.XFER ;                                     7873
17165 062042  012777  000061  133334            MOV     #61,@ML.REG     ;                                       7874
17166 062050  005003                            CLR     R3              ; BLK.CNT                               7879
17167 062052  000411                            BR      23$
17168 062054  005004                    21$:    CLR     R4              ; ADRS.CNT                              7881
17169 062056  152777  000020  133440  22$:      BISB    #20,@ML.REG+120 ;                                       7883
17170 062064  005204                            INC     R4              ; ADRS.CNT                              7881
17171 062066  020427  000177                    CMP     R4,#177         ; ADRS.CNT,*
17172 062072  003771                            BLE     22$
17173 062074  005203                            INC     R3              ; BLK.CNT                               7879
17174 062076  020366  000002            23$:    CMP     R3,2(SP)        ; BLK.CNT,END.CNT
17175 062102  101764                            BLOS    21$
17176 062104  152777  000040  133332            BISB    #40,@ML.REG+40  ;                                       7884
17177 062112  016704  133714                    MOV     ML.DUT,R4
17178 062116  042704  177770                    BIC     #177770,R4
17179 062122  142777  000007  133314            BICB    #7,@ML.REG+40
17180 062130  150477  133310                    BISB    R4,@ML.REG+40
17181 062134  152777  000010  133362            BISB    #10,@ML.REG+120 ;                                       7887
17182 062142  004767  136176                    JSR     PC,LAST.BLK.XFER ;                                      7888
17183 062146  012777  000071  133230            MOV     #71,@ML.REG     ;                                       7889
17184 062154  012703  000001                    MOV     #1,R3           ; *,$$TMP2                              7890
17185 062160  001411                    24$:    BEQ     27$
17186 062162  016704  117730                    MOV     L$DLY,R4        ; *,$$TMP1
17187 062166  001404                            BEQ     26$
17188 062170  005066  000006            25$:    CLR     6(SP)           ; $$TMP
17189 062174  005304                            DEC     R4              ; $$TMP1
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

062176  001374                                  BNE     25$
062200  005303                          26$:    DEC     R3                          ; $$TMP2
062202  000766                                  BR      24$
062204  005002                          27$:    CLR     R2                          ; WD.CNT                                7892
062206  017767  133422  133126          28$:    MOV     @ML.REG+230,PD.TEMP         ;                                       7894
062214  152777  000020  133302                  BISB    #20,@ML.REG+120             ;                                       7895
062222  012703  000001                          MOV     #1,R3                       ; *,$$TMP2                              7896
062226  001411                          29$:    BEQ     32$
062230  016704  117662                          MOV     L$DLY,R4                    ; *,$$TMP1
062234  001404                                  BEQ     31$
062236  005066  000006                  30$:    CLR     6(SP)                       ; $$TMP
062242  005304                                  DEC     R4                          ; $$TMP1
062244  001374                                  BNE     30$
062246  005303                          31$:    DEC     R3                          ; $$TMP2
062250  000766                                  BR      29$
062252  017767  133316  131114          32$:    MOV     @ML.REG+170,D1.TEMP
062260  017767  133320  131110                  MOV     @ML.REG+200,D2.TEMP
062266  017767  133272  131104                  MOV     @ML.REG+160,E2.TEMP
062274  005004                                  CLR     R4                          ; NIB.PTR                               7899
062276  010403                          33$:    MOV     R4,R3                       ; NIB.PTR,*                             7902
062300  006203                                  ASR     R3
062302  006203                                  ASR     R3
062304  006203                                  ASR     R3
062306  062703  015342                          ADD     #PD.TEMP,R3
062312  010346                                  MOV     R3,-(SP)
062314  010446                                  MOV     R4,-(SP)                    ; NIB.PTR,*
062316  042716  177770                          BIC     #177770,(SP)
062322  012746  000001                          MOV     #1,-(SP)
062326  005046                                  CLR     -(SP)
062330  004767  121300                          JSR     PC,BL$GT2
062334  062706  000010                          ADD     #10,SP
062340  005700                                  TST     R0
062342  001011                                  BNE     34$
062344  010446                                  MOV     R4,-(SP)                    ; NIB.PTR,*
062346  010146                                  MOV     R1,-(SP)                    ; BG.PAT,*
062350  012746  000012                          MOV     #12,-(SP)
062354  060616                                  ADD     SP,(SP)                     ; ERR.FLG,*
062356  004767  136014                          JSR     PC,TST.LNG.WRD
062362  062706  000006                          ADD     #6,SP
062366  026627  000004  000001          34$:    CMP     4(SP),#1                    ; ERR.FLG,*                             7906
062374  001001                                  BNE     35$
062376  005216                                  INC     (SP)                        ; ERR.CNT
062400  005204                          35$:    INC     R4                          ; NIB.PTR                               7899
062402  020427  000011                          CMP     R4,#11                      ; NIB.PTR,*
062406  003733                                  BLE     33$
062410  005202                                  INC     R2                          ; WD.CNT                                7892
062412  020227  000177                          CMP     R2,#177                     ; WD.CNT,*
062416  003673                                  BLE     28$
062420  021627  000012                          CMP     (SP),#12                    ; ERR.CNT,*                             7912
062424  003422                                  BLE     36$
062426  104455                                  TRAP    55                          ;                                       7915
062430  000122                                  .WORD   122
```

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17247                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
17248                                   ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
17249
17250 062432  012706                            .WORD   ASYNC
17251 062434  026302                            .WORD   DUMPER
17252 062436  012746  010630                    MOV     #WRD.10,-(SP)           ;                               7916
17253 062442  012746  011276                    MOV     #WRD.51,-(SP)
17254 062446  012746  011270                    MOV     #WRD.50,-(SP)
17255 062452  012746  010256                    MOV     #THR.FMT,-(SP)
17256 062456  012746  000004                    MOV     #4,-(SP)
17257 062462  010600                            MOV     SP,R0                   ; SP,*
17258 062464  104414                            TRAP    14
17259 062466  062706  000012                    ADD     #12,SP                  ;                               7914
17260 062472  005266  000002          36$:      INC     2(SP)                   ; END.CNT                       7919
17261 062476  005101                            COM     R1                      ; BG.PAT                        7920
17262 062500  005205                            INC     R5                      ; TWICE                         7868
17263 062502  020527  000001                    CMP     R5,#1                   ; TWICE,*
17264 062506  003002                            BGT     37$
17265 062510  000167  177262                    JMP     20$
17266 062514  104467                  37$:      TRAP    67                      ;                               7921
17267 062516  006000                            ROR     R0
17268 062520  103002                            BHIS    38$
17269 062522  000167  176434                    JMP     1$
17270 062526  062706  000010          38$:      ADD     #10,SP                  ;                               7772
17271 062532  000207                            RTS     PC
17272
17273                                   ; Routine Size:  377 words
17274                                   ; Maximum stack depth per invocation:  18 words
17279
17280
17284
17285                                           .SBTTL  T31 TEST CODE SECTION
17289 062534                            T31::
17290 062534  004767  176412            1$:     JSR     PC,$T31                 ;                               7923
17291 062540  104466                            TRAP    66
17292 062542  006000                            ROR     R0
17293 062544  103773                            BLO     1$
17294 062546  000207                            RTS     PC
17295
17296                                   ; Routine Size:  6 words
17297                                   ; Maximum stack depth per invocation:  0 words
```

```
                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
17303 ;ML4AD
17304 ;                 TEST CODE SECTION
17305
17306 ;          7925   !<BLF/PAGE>
```

```
17308 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
17309 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)
17310 ;
17311 ;          7926  !
17312 ;          7927  !
17313 ;          7928  BGNTST;
17314 ;          7929
17315 ;          7930  !++
17316 ;          7931  ! TEST NUMBER:  TST 32
17317 ;          7932  !
17318 ;          7933  ! TEST NAME:    ARRAY MODULE SELECTION TEST
17319 ;          7934  !
17320 ;          7935  ! TEST DESCRIPTION:
17321 ;          7936  !
17322 ;          7937  !       TEST FOR UNIQUE ARRAY MODULE
17323 ;          7938  !       SELECTION BY:
17324 ;          7939  !
17325 ;          7940  !       1.  WRITING THE RESPECTIVE ARRAY
17326 ;          7941  !           MODULE POSITION NUMBER INTO
17327 ;          7942  !           THE FIRST GOOD NIBBLE FOUND
17328 ;          7943  !           IN THE ARRAY.  DO FOR ALL
17329 ;          7944  !           PRESENT ARRAYS.
17330 ;          7945  !
17331 ;          7946  !       2.  READ THE ARRAYS FOR THEIR
17332 ;          7947  !           RESPECTIVE POSTION NUMBERS.
17333 ;          7948  !
17334 ;          7949  ! IMPLICIT INPUTS:
17335 ;          7950  !       PD_TEMP:
17336 ;          7951  !       A BIT VECTOR OF 16 BITS WHERE
17337 ;          7952  !       THE READ PROM DATA IS STORED
17338 ;          7953  !       AND ACCESSED FROM.
17339 ;          7954  !
17340 ;          7955  !       IO_BUF :
17341 ;          7956  !       A VECTOR OF 256 WORDS WHERE
17342 ;          7957  !       DATA FOR MBUS READS AND WRITE
17343 ;          7958  !       FUNCTION ARE FOUND.
17344 ;          7959  !
17345 ;          7960  !--
17346 ;          7961
17347 ;          7962  local
17348 ;          7963      WRDS_TSTED,                           !WORDS TESTED
17349 ;          7964      ARR_SEL,                              !ARRAY SELECT
17350 ;          7965      FND_GD_NIB,                           !FOUND GOOD NIBBLE
17351 ;          7966      ARR_NUM;                              !ARRAY NUMBER
17352 ;          7967
17353 ;          7968  ARR_SEL = ZEROES;
17354 ;          7969  ARR_SEL = .ARR_SEL - .ARR_INC;            !START ARR_SEL BACK ONE ARRAY
17355 ;          7970
17356 ;          7971  incr ARR_CNT from 0 to .OP_NUM_ARR do     !TEST ALL PRESENT ARRAYS
17357 ;          7972      begin
17358 ;          7973      CLR_MBUS;
17359 ;          7974      FND_GD_NIB = ZERO;
17360 ;          7975      WRDS_TSTED = ZERO;
17361 ;          7976      DAT_DM = ONE;                         !SET DATA DIAG MODE
17362 ;          7977      MLWC = not 255;                       !LOAD WORD COUNT
```

```
17364 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
17365 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)
17366 ;
17367 ;          7978      MLBA = IO_BUF;                       !LOAD IO_BUF
17368 ;          7979      ARR_SEL = .ARR_SEL + .ARR_INC;       !LOOK AT NEXT ARRAY
17369 ;          7980      MLDA = .ARR_SEL;                     !LOAD DSA WITH SELECTED ARRAY AT BLOCK ZERO
17370 ;          7981      MLCS1 = write;                       !DO A WRITE FUNCTION
17371 ;          7982
17372 ;          7983      do                                   !THIS LOOP WRITES ARRAY NUMBERS TO THE ARRAYS
17373 ;          7984          begin
17374 ;          7985          DELAY (ONE_US);
17375 ;          7986          PD_TEMP = .MLPD;                 !GET THE PROM DATA
17376 ;          7987          WRDS_TSTED = .WRDS_TSTED + 1;    !COUNT WORDS TESTED
17377 ;          7988
17378 ;          7989          incr CNT from 0 to 8 do          !LOOK AT 9 NIBBLES
17379 ;          7990
17380 ;          7991              if .PD_TEMP [.CNT] IS_NOT_SET    !FIND A GOOD NIBBLE
17381 ;          7992              then
17382 ;          7993                  begin
17383 ;          7994
17384 ;          7995                  case .CNT from 0 to 8 of     !SELECT AND LOAD GOOD NIBBLE WITH ARRAY CNT
17385 ;          7996                      set
17386 ;          7997
17387 ;          7998                      [0] :
17388 ;          7999                          (MLD1)<0, 4> = .ARR_CNT;        !NIBBLE 0
17389 ;          8000
17390 ;          8001                      [1] :
17391 ;          8002                          (MLD1)<4, 4> = .ARR_CNT;        !NIBBLE 1
17392 ;          8003
17393 ;          8004                      [2] :
17394 ;          8005                          (MLD1)<8, 4> = .ARR_CNT;        !NIBBLE 2
17395 ;          8006
17396 ;          8007                      [3] :
17397 ;          8008                          (MLD1)<12, 4> = .ARR_CNT;       !NIBBLE 3
17398 ;          8009
17399 ;          8010                      [4] :
17400 ;          8011                          (MLD2)<0, 4> = .ARR_CNT;        !NIBBLE 4
17401 ;          8012
17402 ;          8013                      [5] :
17403 ;          8014                          (MLD2)<4, 4> = .ARR_CNT;        !NIBBLE 5
17404 ;          8015
17405 ;          8016                      [6] :
17406 ;          8017                          (MLD2)<8, 4> = .ARR_CNT;        !NIBBLE 6
17407 ;          8018
17408 ;          8019                      [7] :
17409 ;          8020                          (MLD2)<12, 4> = .ARR_CNT;       !NIBBLE 7
17410 ;          8021
17411 ;          8022                      [8] :
17412 ;          8023                          (MLE2)<8, 4> = .ARR_CNT;        !NIBBLE 8
17413 ;          8024                      tes;
17414 ;          8025
17415 ;          8026                  FND_GD_NIB = ONE;            !SET FOUND GOOD NIBBLE FLG
17416 ;          8027                  exitloop;                    !EXIT THE LOOP
17417 ;          8028                  end;
17418 ;          8029
```

```
17420 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
17421 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)
17422 ;
17423 ;          8030          DAT_CLK = ONE;                   !CLOCK GOOD NIBBLE INTO MEMORY & GET NXT PROM WRD
17424 ;          8031          end
17425 ;          8032      until (.FND_GD_NIB IS_SET ) or (.WRDS_TSTED eql 14);       !DO UNTIL FOUND GOOD NIBBLE OR 14 WRDS TSTED
17426 ;          8033
17427 ;          8034      if .WRDS_TSTED eql 14                !IF 14 WORDS TSTED
17428 ;          8035      then
17429 ;          8036          begin                            !THEN ERROR AND EXIT TESTED
17430 ;          8037          ERRDF (142, INTER, DUMPER);
17431 ;          8038          PRINTB (SEV_FAT, WRD_14, PHR_10, FNC_15, WRD_12, FNC_17, WRD_37, WRD_56);
17432 ;          8039          EXIT_TST;
17433 ;          8040          end;
17434 ;          8041
17435 ;          8042      end;
17436 ;          8043
17437 ;          8044  ARR_SEL = ZEROES;
17438 ;          8045  ARR_SEL = .ARR_SEL - .ARR_INC;           !START ARR SEL BACK ONE AGAIN
17439 ;          8046
17440 ;          8047  incr ARR_CNT from 0 to .OP_NUM_ARR do    !TEST ALL PRESENT ARRAYS
17441 ;          8048      begin
17442 ;          8049      BGNSUB;
17443 ;          8050      CLR_MBUS;
17444 ;          8051      FND_GD_NIB = ZERO;
17445 ;          8052      DAT_DM = ONE;                        !SET DATA DIAG MODE
17446 ;          8053      MLWC = not 255;                      !LOAD WORD COUNT
17447 ;          8054      MLBA = IO_BUF;                       !LOAD UBUS ADDRESS
17448 ;          8055      ARR_SEL = .ARR_SEL + .ARR_INC;       !LOOK AT NEXT ARRAY
17449 ;          8056      MLDA = .ARR_SEL;                     !LOAD DSA WITH ARRAY SELECT
17450 ;          8057      MLCS1 = read;                        !DO A READ FUNCTION
17451 ;          8058
17452 ;          8059      do                                   !THIS LOOP READS ARRAYS FOR ARRAY NUMBERS
17453 ;          8060          begin
17454 ;          8061          DELAY (ONE_US);
17455 ;          8062          PD_TEMP = .MLPD;                 !GET THE PROM DATA
17456 ;          8063
17457 ;          8064          incr CNT from 0 to 8 do          !LOOK AT 9 NIBBLES
17458 ;          8065
17459 ;          8066              if .PD_TEMP [.CNT] IS_NOT_SET    !FIND THE GOOD NIBBLES WHERE ARR NUM IS STORED
17460 ;          8067              then
17461 ;          8068                  begin
17462 ;          8069                  DAT_CLK = ONE;           !CLOCK ARRAY WORD OUT
17463 ;          8070
17464 ;          8071                  case .CNT from 0 to 8 of     !SELECT AND READ GOOD NIBBLE
17465 ;          8072                      set
17466 ;          8073
17467 ;          8074                      [0] :
17468 ;          8075                          ARR_NUM = .(MLD1)<0, 4>;      !NIBBLE 0
17469 ;          8076
17470 ;          8077                      [1] :
17471 ;          8078                          ARR_NUM = .(MLD1)<4, 4>;      !NIBBLE 1
17472 ;          8079
17473 ;          8080                      [2] :
17474 ;          8081                          ARR_NUM = .(MLD1)<8, 4>;      !NIBBLE 2
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)

;                                    [3] :
;                                        ARR_NUM = .(MLD1)<12, 4>;        !NIBBLE 3

;                                    [4] :
;                                        ARR_NUM = .(MLD2)<0, 4>;         !NIBBLE 4

;                                    [5] :
;                                        ARR_NUM = .(MLD2)<4, 4>;         !NIBBLE 5

;                                    [6] :
;                                        ARR_NUM = .(MLD2)<8, 4>;         !NIBBLE 6

;                                    [7] :
;                                        ARR_NUM = .(MLD2)<12, 4>;        !NIBBLE 7

;                                    [8] :
;                                        ARR_NUM = .(MLE2)<8, 4>;         !NIBBLE 8
;                                    tes;

;                                FND_GD_NIB = ONE;                    !SET FND GD NIB FLG
;                                exitloop;                            !EXIT LOOP
;                                end;

;                        DAT_CLK = ONE;                               !CLOCK OUT NEXT PROM LOCATION
;                        end
;                    until .FND_GD_NIB IS_SET;                        !REPEAT UNTIL FOUND THE GOOD NIBBLE

;                    if .ARR_CNT neq .ARR_NUM                         !SEE IF ARRAY CONTAINS IT'S ARR NUM
;                    then
;                        begin                                        !ERROR IF NOT THERE
;                        ERRDF (83, ASYNC, DUMPER);
;                        PRINTB (FOR_FMT, WRD_39, FNC_17, WRD_37, WRD_10);
;                        PRINTB (FMT_14, .ARR_CNT, .ARR_NUM);
;                        end;

;                    ENDSUB;
;                    end;

;                ENDTST;

                                        .SBTTL  $T32 TEST CODE SECTION
062550  004167  122036          $T32:   JSR     R1,$SAVE5                       ;                                   7924
062554  162706  000006                  SUB     #6,SP
062560  005005                          CLR     R5                              ; ARR.SEL                           7968
062562  166705  131216                  SUB     ARR.INC,R5                      ; *,ARR.SEL                         7969
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

062566  016766  131210  000002                MOV     OP.NUM.ARR,2(SP)                ;                                       7971
062574  005003                                CLR     R3                              ; ARR.CNT
062576  000167  000702                        JMP     27$
062602  152777  000040  132634  1$:           BISB    #40,@ML.REG+40                  ;                                       7972
062610  016702  133216                        MOV     ML.DUT,R2
062614  042702  177770                        BIC     #177770,R2
062620  142777  000007  132616                BICB    #7,@ML.REG+40
062626  150277  132612                        BISB    R2,@ML.REG+40
062632  005016                                CLR     (SP)                            ; FND.GD.NIB                            7974
062634  005004                                CLR     R4                              ; WRDS.TSTED                            7975
062636  152777  000010  132660                BISB    #10,@ML.REG+120                 ;                                       7976
062644  012777  177400  132542                MOV     #-400,@ML.REG+10                ;                                       7977
062652  012777  014022  132544                MOV     #IO.BUF,@ML.REG+20              ;                                       7978
062660  066705  131120                        ADD     ARR.INC,R5                      ; *,ARR.SEL                             7979
062664  010577  132544                        MOV     R5,@ML.REG+30                   ; ARR.SEL,*                             7980
062670  012777  000061  132506                MOV     #61,@ML.REG                     ;                                       7981
062676  012701  000001          2$:           MOV     #1,R1                           ; *,$$TMP2                              7985
062702  001411                  3$:           BEQ     6$
062704  016702  117206                        MOV     L$DLY,R2                        ; *,$$TMP1
062710  001404                                BEQ     5$
062712  005066  000004          4$:           CLR     4(SP)                           ; $$TMP
062716  005302                                DEC     R2                              ; $$TMP1
062720  001374                                BNE     4$
062722  005301                  5$:           DEC     R1                              ; $$TMP2
062724  000766                                BR      3$
062726  017767  132702  132406  6$:           MOV     @ML.REG+230,PD.TEMP             ;                                       7986
062734  005204                                INC     R4                              ; WRDS.TSTED                            7987
062736  005002                                CLR     R2                              ; CNT                                   7989
062740  010201                  7$:           MOV     R2,R1                           ; CNT,*                                 7991
062742  006201                                ASR     R1
062744  006201                                ASR     R1
062746  006201                                ASR     R1
062750  062701  015342                        ADD     #PD.TEMP,R1
062754  010146                                MOV     R1,-(SP)
062756  010246                                MOV     R2,-(SP)                        ; CNT,*
062760  042716  177770                        BIC     #177770,(SP)
062764  012746  000001                        MOV     #1,-(SP)
062770  005046                                CLR     -(SP)
062772  004767  120636                        JSR     PC,BL$GT2
062776  062706  000010                        ADD     #10,SP
063002  005700                                TST     R0
063004  001155                                BNE     23$
063006  010201                                MOV     R2,R1                           ; CNT,*                                 7995
063010  006301                                ASL     R1
063012  066107  063016                        ADD     8$(R1),PC
063016  000022                  8$:           .WORD   9$-8$
063020  000040                                .WORD   10$-8$
063022  000072                                .WORD   12$-8$
063024  000112                                .WORD   13$-8$
063026  000146                                .WORD   15$-8$
063030  000164                                .WORD   16$-8$
063032  000216                                .WORD   18$-8$
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

 063034  000236                                 .WORD   19$-8$
 063036  000272                                 .WORD   21$-8$
 063040  010301                         9$:     MOV     R3,R1                   ; ARR.CNT,*                     7999
 063042  042701  177760                         BIC     #177760,R1
 063046  142777  000017  132520                 BICB    #17,@ML.REG+170
 063054  000412                                 BR      11$
 063056  010301                         10$:    MOV     R3,R1                   ; ARR.CNT,*                     8002
 063060  006301                                 ASL     R1
 063062  006301                                 ASL     R1
 063064  006301                                 ASL     R1
 063066  006301                                 ASL     R1
 063070  042701  177417                         BIC     #177417,R1
 063074  142777  000360  132472                 BICB    #360,@ML.REG+170
 063102  150177  132466                 11$:    BISB    R1,@ML.REG+170
 063106  000511                                 BR      22$                     ;                               7995
 063110  010301                         12$:    MOV     R3,R1                   ; ARR.CNT,*                     8005
 063112  000301                                 SWAB    R1
 063114  042701  170377                         BIC     #170377,R1
 063120  042777  007400  132446                 BIC     #7400,@ML.REG+170
 063126  000413                                 BR      14$
 063130  010301                         13$:    MOV     R3,R1                   ; ARR.CNT,*                     8008
 063132  000301                                 SWAB    R1
 063134  006301                                 ASL     R1
 063136  006301                                 ASL     R1
 063140  006301                                 ASL     R1
 063142  006301                                 ASL     R1
 063144  042701  007777                         BIC     #7777,R1
 063150  042777  170000  132416                 BIC     #170000,@ML.REG+170
 063156  050177  132412                 14$:    BIS     R1,@ML.REG+170
 063162  000463                                 BR      22$                     ;                               7995
 063164  010301                         15$:    MOV     R3,R1                   ; ARR.CNT,*                     8011
 063166  042701  177760                         BIC     #177760,R1
 063172  142777  000017  132404                 BICB    #17,@ML.REG+200
 063200  000412                                 BR      17$
 063202  010301                         16$:    MOV     R3,R1                   ; ARR.CNT,*                     8014
 063204  006301                                 ASL     R1
 063206  006301                                 ASL     R1
 063210  006301                                 ASL     R1
 063212  006301                                 ASL     R1
 063214  042701  177417                         BIC     #177417,R1
 063220  142777  000360  132356                 BICB    #360,@ML.REG+200
 063226  150177  132352                 17$:    BISB    R1,@ML.REG+200
 063232  000437                                 BR      22$                     ;                               7995
 063234  010301                         18$:    MOV     R3,R1                   ; ARR.CNT,*                     8017
 063236  000301                                 SWAB    R1
 063240  042701  170377                         BIC     #170377,R1
 063244  042777  007400  132332                 BIC     #7400,@ML.REG+200
 063252  000413                                 BR      20$
 063254  010301                         19$:    MOV     R3,R1                   ; ARR.CNT,*                     8020
 063256  000301                                 SWAB    R1
 063260  006301                                 ASL     R1
 063262  006301                                 ASL     R1
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

063264  006301                                  ASL     R1
063266  006301                                  ASL     R1
063270  042701  007777                          BIC     #7777,R1
063274  042777  170000  132302                  BIC     #170000,@ML.REG+200
063302  050177  132276                  20$:    BIS     R1,@ML.REG+200
063306  000411                                  BR      22$                     ;                                       7995
063310  010301                          21$:    MOV     R3,R1                   ; ARR.CNT,*                             8023
063312  000301                                  SWAB    R1
063314  042701  170377                          BIC     #170377,R1
063320  042777  007400  132236                  BIC     #7400,@ML.REG+160
063326  050177  132232                          BIS     R1,@ML.REG+160
063332  012716  000001                  22$:    MOV     #1,(SP)                 ; *,FND.GD.NIB                          8026
063336  000406                                  BR      24$                     ;                                       8027
063340  005202                          23$:    INC     R2                      ; CNT                                   7989
063342  020227  000010                          CMP     R2,#10                  ; CNT,*
063346  003002                                  BGT     24$
063350  000167  177364                          JMP     7$
063354  152777  000020  132142          24$:    BISB    #20,@ML.REG+120         ;                                       8030
063362  021627  000001                          CMP     (SP),#1                 ; FND.GD.NIB,*                          8032
063366  001405                                  BEQ     25$
063370  020427  000016                          CMP     R4,#16                  ; WRDS.TSTED,*
063374  001402                                  BEQ     25$
063376  000167  177274                          JMP     2$
063402  020427  000016                  25$:    CMP     R4,#16                  ; WRDS.TSTED,*                          8034
063406  001035                                  BNE     26$
063410  104455                                  TRAP    55                      ;                                       8037
063412  000216                                  .WORD   216
063414  013114                                  .WORD   INTER
063416  026302                                  .WORD   DUMPER
063420  012746  011344                          MOV     #WRD.56,-(SP)           ;                                       8038
063424  012746  011122                          MOV     #WRD.37,-(SP)
063430  012746  012404                          MOV     #FNC.17,-(SP)
063434  012746  010650                          MOV     #WRD.12,-(SP)
063440  012746  012360                          MOV     #FNC.15,-(SP)
063444  012746  012006                          MOV     #PHR.10,-(SP)
063450  012746  010664                          MOV     #WRD.14,-(SP)
063454  012746  010342                          MOV     #SEV.FMT,-(SP)
063460  012746  000010                          MOV     #10,-(SP)
063464  010600                                  MOV     SP,R0                   ; SP,*
063466  104414                                  TRAP    14
063470  104463                                  TRAP    63
063472  062706  000022                          ADD     #22,SP                  ;                                       8034
063476  000167  000562                          JMP     56$                     ;                                       8036
063502  005203                          26$:    INC     R3                      ; ARR.CNT                               7971
063504  020366  000002                  27$:    CMP     R3,2(SP)                ; ARR.CNT,*
063510  003002                                  BGT     28$
063512  000167  177064                          JMP     1$
063516  005005                          28$:    CLR     R5                      ; ARR.SEL                               8044
063520  166705  130260                          SUB     ARR.INC,R5              ; *,ARR.SEL                             8045
063524  016766  130252  000002                  MOV     OP.NUM.ARR,2(SP)        ;                                       8047
063532  005004                                  CLR     R4                      ; ARR.CNT
063534  000167  000516                          JMP     55$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

063540  104402                          29$:    TRAP    2                       ;                                       8048
063542  152777  000040  131674                  BISB    #40,@ML.REG+40          ;                                       8049
063550  016702  132256                          MOV     ML.DUT,R2
063554  042702  177770                          BIC     #177770,R2
063560  142777  000007  131656                  BICB    #7,@ML.REG+40
063566  150277  131652                          BISB    R2,@ML.REG+40
063572  005016                                  CLR     (SP)                    ; FND.GD.NIB                            8051
063574  152777  000010  131722                  BISB    #10,@ML.REG+120         ;                                       8052
063602  012777  177400  131604                  MOV     #-400,@ML.REG+10        ;                                       8053
063610  012777  014022  131606                  MOV     #IO.BUF,@ML.REG+20      ;                                       8054
063616  066705  130162                          ADD     ARR.INC,R5              ; *,ARR.SEL                             8055
063622  010577  131606                          MOV     R5,@ML.REG+30           ; ARR.SEL,*                             8056
063626  012777  000071  131550                  MOV     #71,@ML.REG             ;                                       8057
063634  012701  000001                  30$:    MOV     #1,R1                   ; *,$$TMP2                              8061
063640  001411                          31$:    BEQ     34$
063642  016702  116250                          MOV     L$DLY,R2                ; *,$$TMP1
063646  001404                                  BEQ     33$
063650  005066  000004                  32$:    CLR     4(SP)                   ; $$TMP
063654  005302                                  DEC     R2                      ; $$TMP1
063656  001374                                  BNE     32$
063660  005301                          33$:    DEC     R1                      ; $$TMP2
063662  000766                                  BR      31$
063664  017767  131744  131450          34$:    MOV     @ML.REG+230,PD.TEMP     ;                                       8062
063672  005002                                  CLR     R2                      ; CNT                                   8064
063674  010201                          35$:    MOV     R2,R1                   ; CNT,*                                 8066
063676  006201                                  ASR     R1
063700  006201                                  ASR     R1
063702  006201                                  ASR     R1
063704  062701  015342                          ADD     #PD.TEMP,R1
063710  010146                                  MOV     R1,-(SP)
063712  010246                                  MOV     R2,-(SP)                ; CNT,*
063714  042716  177770                          BIC     #177770,(SP)
063720  012746  000001                          MOV     #1,-(SP)
063724  005046                                  CLR     -(SP)
063726  004767  117702                          JSR     PC,BL$GT2
063732  062706  000010                          ADD     #10,SP
063736  005700                                  TST     R0
063740  001070                                  BNE     50$
063742  152777  000020  131554                  BISB    #20,@ML.REG+120         ;                                       8069
063750  010201                                  MOV     R2,R1                   ; CNT,*                                 8071
063752  006301                                  ASL     R1
063754  066107  063760                          ADD     36$(R1),PC
063760  000022                          36$:    .WORD   37$-36$
063762  000030                                  .WORD   38$-36$
063764  000036                                  .WORD   39$-36$
063766  000044                                  .WORD   40$-36$
063770  000052                                  .WORD   41$-36$
063772  000060                                  .WORD   42$-36$
063774  000076                                  .WORD   44$-36$
063776  000104                                  .WORD   45$-36$
064000  000122                                  .WORD   47$-36$
064002  117703  131566                  37$:    MOVB    @ML.REG+170,R3          ; *,ARR.NUM                             8075
```

```
                                                                                                    29-Mar-1982 16:23:04    TOPS
                                                                                                    29-Mar-1982 16:21:03    PA:<
17756                                        ;ML4AD
17757                                        ;                  TEST CODE SECTION
17758
17759 064006  000440                                  BR       49$
17760 064010  117703  131560                38$:     MOVB     @ML.REG+170,R3          ; *,ARR.NUM                      8078
17761 064014  000413                                  BR       43$
17762 064016  017703  131552                39$:     MOV      @ML.REG+170,R3          ; *,ARR.NUM                      8081
17763 064022  000431                                  BR       48$
17764 064024  017703  131544                40$:     MOV      @ML.REG+170,R3          ; *,ARR.NUM                      8084
17765 064030  000417                                  BR       46$
17766 064032  117703  131546                41$:     MOVB     @ML.REG+200,R3          ; *,ARR.NUM                      8087
17767 064036  000424                                  BR       49$
17768 064040  117703  131540                42$:     MOVB     @ML.REG+200,R3          ; *,ARR.NUM                      8090
17769 064044  006203                        43$:     ASR      R3                      ; ARR.NUM
17770 064046  006203                                 ASR      R3                      ; ARR.NUM
17771 064050  006203                                 ASR      R3                      ; ARR.NUM
17772 064052  006203                                 ASR      R3                      ; ARR.NUM
17773 064054  000415                                  BR       49$
17774 064056  017703  131522                44$:     MOV      @ML.REG+200,R3          ; *,ARR.NUM                      8093
17775 064062  000411                                  BR       48$
17776 064064  017703  131514                45$:     MOV      @ML.REG+200,R3          ; *,ARR.NUM                      8096
17777 064070  006203                        46$:     ASR      R3                      ; ARR.NUM
17778 064072  006203                                 ASR      R3                      ; ARR.NUM
17779 064074  006203                                 ASR      R3                      ; ARR.NUM
17780 064076  006203                                 ASR      R3                      ; ARR.NUM
17781 064100  000402                                  BR       48$
17782 064102  017703  131456                47$:     MOV      @ML.REG+160,R3          ; *,ARR.NUM                      8099
17783 064106  000303                        48$:     SWAB     R3                      ; ARR.NUM
17784 064110  042703  177760                49$:     BIC      #177760,R3             ; *,ARR.NUM
17785 064114  012716  000001                         MOV      #1,(SP)                 ; *,FND.GD.NIB                   8102
17786 064120  000404                                  BR       51$                     ;                                8103
17787 064122  005202                        50$:     INC      R2                      ; CNT                            8064
17788 064124  020227  000010                         CMP      R2,#10                  ; CNT,*
17789 064130  003661                                 BLE      35$
17790 064132  152777  000020  131364        51$:     BISB     #20,@ML.REG+120         ;                                8106
17791 064140  021627  000001                         CMP      (SP),#1                 ; FND.GD.NIB,*                   8108
17792 064144  001233                                 BNE      30$
17793 064146  020403                                 CMP      R4,R3                   ; ARR.CNT,ARR.NUM                8110
17794 064150  001434                                 BEQ      52$
17795 064152  104455                                 TRAP     55                      ;                                8113
17796 064154  000123                                 .WORD    123
17797 064156  012706                                 .WORD    ASYNC
17798 064160  026302                                 .WORD    DUMPER
17799 064162  012746  010630                         MOV      #WRD.10,-(SP)           ;                                8114
17800 064166  012746  011122                         MOV      #WRD.37,-(SP)
17801 064172  012746  012404                         MOV      #FNC.17,-(SP)
17802 064176  012746  011140                         MOV      #WRD.39,-(SP)
17803 064202  012746  010270                         MOV      #FOR.FMT,-(SP)
17804 064206  012746  000005                         MOV      #5,-(SP)
17805 064212  010600                                 MOV      SP,R0                   ; SP,*
17806 064214  104414                                 TRAP     14
17807 064216  010316                                 MOV      R3,(SP)                 ; ARR.NUM,*                      8115
17808 064220  010446                                 MOV      R4,-(SP)                ; ARR.CNT,*
17809 064222  012746  007330                         MOV      #FMT.14,-(SP)
17810 064226  012746  000003                         MOV      #3,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

064232  010600                                  MOV     SP,R0                           ; SP,*
064234  104414                                  TRAP    14
064236  062706  000022                          ADD     #22,SP                          ;                                       8112
064242  104467                          52$:    TRAP    67                              ;                                       8116
064244  006000                                  ROR     R0
064246  103002                                  BHIS    54$
064250  000167  177264                  53$:    JMP     29$
064254  005204                          54$:    INC     R4                              ; ARR.CNT                               8047
064256  020466  000002                  55$:    CMP     R4,2(SP)                        ; ARR.CNT,*
064262  003772                                  BLE     53$
064264  062706  000006                  56$:    ADD     #6,SP                           ;                                       7924
064270  000207                                  RTS     PC

                                        ; Routine Size:  425 words
                                        ; Maximum stack depth per invocation:  18 words



                                                .SBTTL  T32 TEST CODE SECTION
064272                                  T32::
064272  004767  176252                  1$:     JSR     PC,$T32                         ;                                       8119
064276  104466                                  TRAP    66
064300  006000                                  ROR     R0
064302  103773                                  BLO     1$
064304  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;           8122  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (85)

```
17861 ;ML4AD
17862 ;                 TEST CODE SECTION
17863 ;
17864 ;          8123  !
17865 ;          8124  BGNTST;
17866 ;          8125
17867 ;          8126  !++
17868 ;          8127  ! TEST NUMBER:  TST 33
17869 ;          8128  !
17870 ;          8129  ! TEST NAME:    SEQUENCER EXISTENCE TEST
17871 ;          8130  !
17872 ;          8131  ! TEST DESCRIPTION:
17873 ;          8132  !
17874 ;          8133  !       TEST SEQUENCER TIMING AND CONTROL
17875 ;          8134  !       LOGIC FOR EXISTENCE BY:
17876 ;          8135  !
17877 ;          8136  !       1.  FIRST WRITING THE GOOD BLOCK vIA DAT_DM MODE WITH A BACKGROUND
17878 ;          8137  !           PATTERN OF ONES.
17879 ;          8138  !
17880 ;          8139  !
17881 ;          8140  !       2.  VIA A MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
17882 ;          8141  !
17883 ;          8142  !       3.  THEN VIA DAT_DM READ GOOD NIBBLES IN THE GOOD BLOCK AND XOR THEM
17884 ;          8143  !           AGAINST THE BACKGROUND PATTERN.
17885 ;          8144  !
17886 ;          8145  !           RECORD THE NUMBER OF NIBBLES THAT WERE UNCHANGED OR PARTIALLY CHANGED
17887 ;          8146  !           BY THE MBUS WIRTE.
17888 ;          8147  !
17889 ;          8148  !       4.  REPORT A FATAL ERROR AND DROP THIS UNIT IF THE NIBBLES TESTED EQUALS
17890 ;          8149  !           THE COUNT OF UNCHANGED NIBBLES.
17891 ;          8150  !
17892 ;          8151  !           REPORT AN INTERMEDIATE DIAGNOSTIC MESSAGE IF AT LEAST SOME NIBBLES
17893 ;          8152  !           WERE CHANGED BY THE MBUS WRITE.
17894 ;          8153  !
17895 ;          8154  ! IMPLICIT INPUTS:
17896 ;          8155  !       PD_TEMP:
17897 ;          8156  !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
17898 ;          8157  !
17899 ;          8158  !       IO_BUF:
17900 ;          8159  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTIONS
17901 ;          8160  !       ARE FOUND.
17902 ;          8161  !--
17903 ;          8162
17904 ;          8163  Local
17905 ;          8164      BG_PAT,                         !BACK GROUND PATTERN
17906 ;          8165      SUM_BAD,                        !SUM NIBBLE ARE BAD
17907 ;          8166      NIB_TSTED,                      !NIBBLES TESTED
17908 ;          8167      ALL_BAD,                        !ALL NIBBLES ARE BAD
17909 ;          8168      RESULT;                         !RESULTS OF XOR
17910 ;          8169
17911 ;          8170  CLR_MBUS;
17912 ;          8171  BG_PAT = ONES;                      !BACKGROUND EQL ONES
17913 ;          8172  MLD1 = .BG_PAT;                     !LOAD DATA DIAG REG WITH BG PAT
17914 ;          8173  MLD2 = .BG_PAT;
17915 ;          8174  MLE2 = .BG_PAT;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (85)

;          8175  DAT_DM_XFER ();                          !SET UP A  DATA DIAG XFERR AT THE GOOD BLOCK
;          8176  MLCS1 = write;                          !DO A WRITE FUNCTION
;          8177
;          8178  incr WD_CNT from 0 to 127 do            !WRITE BLOCK WITH BG PAT
;          8179      begin
;          8180      DELAY (ONE_US);
;          8181      DAT_CLK = ONE;
;          8182      end;
;          8183
;          8184  CLR_MBUS;
;          8185  IO_BUF = ZEROES;                        !LOAD FIRST WORD OF IO_BUF
;          8186  BAT = ONE;                              !MAKE XFERR SET ON ONE ADRS
;          8187  GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
;          8188  MLCS1 = write;                          !DO A WRITE FUNCTION
;          8189  TIME_OUT_LOOP;
;          8190  BGNSUB;
;          8191  CLR_MBUS;
;          8192  ALL_BAD = ZEROES;
;          8193  SUM_BAD = ZEROES;
;          8194  NIB_TSTED = ZEROES;
;          8195  DAT_DM_XFER ();                          !SET UP SAME DATA DIAG XFERR
;          8196  MLCS1 = read;                           !DO A READ FUNCTION
;          8197  DELAY (ONE_US);
;          8198
;          8199  incr WD_CNT from 0 to 112 do            !READ 113 LONG WORDS
;          8200      begin
;          8201      PD_TEMP = .MLPD;                    !GET PROM DATA
;          8202      DAT_CLK = ONE;                      !CLOCK OUT THE DATA WORD
;          8203      DELAY (ONE_US);
;          8204      RD_LNG_WRD;                         !READ THE DATA WORD
;          8205
;          8206      incr NIB_PTR from 0 to 8 do         !LOOK AT 9 NIBBLES
;          8207
;          8208          if .PD_TEMP [.NIB_PTR] eql ZERO !FIND GOOD NIBBLE
;          8209          then
;          8210              begin
;          8211              NIB_TSTED = .NIB_TSTED + 1; !INCREMENT COUNT OF NIBBLES TESTED
;          8212              XOR_LNG_WRD (.NIB_PTR, .BG_PAT, RESULT);    !XOR NIBBLE WITH BG PAT
;          8213
;          8214              if .RESULT<0, 4> eql ZERO   !SEE IF ALL BITS IN NIBBLE WERE BAD?
;          8215              then
;          8216                  ALL_BAD = .ALL_BAD + 1  !INCREMENT COUNT IF ALL BAD
;          8217              else
;          8218
;          8219                  if .RESULT<0, 4> neq %o'17' then SUM_BAD = .SUM_BAD + 1;
;          8220
;          8221                                          !SEE IF SOME BITS IN NIBBLE WERE BAD
;          8222              end;                        !INCREMENT COUNT IF SOME BAD
;          8223
;          8224      end;
;          8225
;          8226  ENDSUB;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI 4 (85)

;          8227
;          8228  if .NIB_TSTED eql .ALL_BAD                !WHERE ALL NIBBLES XFERR'ED ALL BAD?
;          8229  then                                      !ERROR IF ALL BAD
;          8230      begin
;          8231      ERRDF (84, SYNC, DUMPER);
;          8232      PRINTB (SEV_FMT, WRD_22, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
;          8233      DODU (.ML_LON);
;          8234      DOCLN;
;          8235      end
;          8236  else
;          8237
;          8238      if .SUM_BAD gtr ZERO                  !SEE IF SEE NIBBLE WERE BAD?
;          8239      then
;          8240          begin                             !SOME BAD IS OK SO GIVE INTERMEDIATE ERROR
;          8241          ERRDF (85, INTER, DUMPER);
;          8242          PRINTB (SIX_FMT, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
;          8243          end;
;          8244
;          8245  ENDTST;

                                        .SBTTL  $T33 TEST CODE SECTION
064306  004167  120300          $T33:   JSR     R1,$SAVE5               ;                               8121
064312  162706  000010                  SUB     #10,SP
064316  152777  000040  131120          BISB    #40,@ML.REG+40          ;                               8168
064324  016705  131502                  MOV     ML.DUT,R5
064330  042705  177770                  BIC     #177770,R5
064334  142777  000007  131102          BICB    #7,@ML.REG+40
064342  150577  131076                  BISB    R5,@ML.REG+40
064346  012766  177777  000002          MOV     #-1,2(SP)               ; *,BG.PAT                      8171
064354  012777  177777  131212          MOV     #-1,@ML.REG+170         ;                               8172
064362  016677  000002  131214          MOV     2(SP),@ML.REG+200       ; BG.PAT,*                      8173
064370  016677  000002  131166          MOV     2(SP),@ML.REG+160       ; BG.PAT,*                      8174
064376  004767  132010                  JSR     PC,DAT.DM.XFER          ;                               8175
064402  012777  000061  130774          MOV     #61,@ML.REG             ;                               8176
064410  005000                          CLR     R0                      ; WD.CNT                        8178
064412  012701  000001          1$:     MOV     #1,R1                   ; *,$$TMP2                      8180
064416  001411                  2$:     BEQ     5$
064420  016702  115472                  MOV     L$DLY,R2                ; *,$$TMP1
064424  001404                          BEQ     4$
064426  005066  000006          3$:     CLR     6(SP)                   ; $$TMP
064432  005302                          DEC     R2                      ; $$TMP1
064434  001374                          BNE     3$
064436  005301                  4$:     DEC     R1                      ; $$TMP2
064440  000766                          BR      2$
064442  152777  000020  131054  5$:     BISB    #20,@ML.REG+120         ;                               8181
064450  005200                          INC     R0                      ; WD.CNT                        8178
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

064452  020027  000177                          CMP     R0,#177                         ; WD.CNT,*
064456  003755                                  BLE     1$
064460  152777  000040  130756                  BISB    #40,@ML.REG+40                  ;                                       8182
064466  016705  131340                          MOV     ML.DUT,R5
064472  042705  177770                          BIC     #177770,R5
064476  142777  000007  130740                  BICB    #7,@ML.REG+40
064504  150577  130734                          BISB    R5,@ML.REG+40
064510  005067  127306                          CLR     IO.BUF                          ;                                       8185
064514  152777  000010  130722                  BISB    #10,@ML.REG+40                  ;                                       8186
064522  004767  133564                          JSR     PC,GD.BLK.XFER                  ;                                       8187
064526  012777  000061  130650                  MOV     #61,@ML.REG                     ;                                       8188
064534  105777  130714                  6$:     TSTB    @ML.REG+50
064540  100375                                  BPL     6$
064542  104402                          7$:     TRAP    2                               ;                                       8189
064544  152777  000040  130672                  BISB    #40,@ML.REG+40                  ;                                       8190
064552  016703  131254                          MOV     ML.DUT,R3
064556  042703  177770                          BIC     #177770,R3
064562  142777  000007  130654                  BICB    #7,@ML.REG+40
064570  150377  130650                          BISB    R3,@ML.REG+40
064574  005004                                  CLR     R4                              ; ALL.BAD                               8192
064576  005016                                  CLR     (SP)                            ; SUM.BAD                               8193
064600  005005                                  CLR     R5                              ; NIB.TSTED                             8194
064602  004767  131604                          JSR     PC,DAT.DM.XFER                  ;                                       8195
064606  012777  000071  130570                  MOV     #71,@ML.REG                     ;                                       8196
064614  012701  000001                          MOV     #1,R1                           ; *,$$TMP2                              8197
064620  001411                          8$:     BEQ     11$
064622  016702  115270                          MOV     L$DLY,R2                        ; *,$$TMP1
064626  001404                                  BEQ     10$
064630  005066  000006                  9$:     CLR     6(SP)                           ; $$TMP
064634  005302                                  DEC     R2                              ; $$TMP1
064636  001374                                  BNE     9$
064640  005301                          10$:    DEC     R1                              ; $$TMP2
064642  000766                                  BR      8$
064644  005003                          11$:    CLR     R3                              ; WD.CNT                                8199
064646  017767  130762  130466          12$:    MOV     @ML.REG+230,PD.TEMP             ;                                       8201
064654  152777  000020  130642                  BISB    #20,@ML.REG+120                 ;                                       8202
064662  012701  000001                          MOV     #1,R1                           ; *,$$TMP2                              8203
064666  001411                          13$:    BEQ     16$
064670  016702  115222                          MOV     L$DLY,R2                        ; *,$$TMP1
064674  001404                                  BEQ     15$
064676  005066  000006                  14$:    CLR     6(SP)                           ; $$TMP
064702  005302                                  DEC     R2                              ; $$TMP1
064704  001374                                  BNE     14$
064706  005301                          15$:    DEC     R1                              ; $$TMP2
064710  000766                                  BR      13$
064712  017767  130656  126454          16$:    MOV     @ML.REG+170,D1.TEMP
064720  017767  130660  126450                  MOV     @ML.REG+200,D2.TEMP
064726  017767  130632  126444                  MOV     @ML.REG+160,E2.TEMP
064734  005001                                  CLR     R1                              ; NIB.PTR                               8206
064736  010102                          17$:    MOV     R1,R2                           ; NIB.PTR,*                             8208
064740  006202                                  ASR     R2
064742  006202                                  ASR     R2
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

064744  006202                                  ASR     R2
064746  062702  015342                          ADD     #PD.TEMP,R2
064752  010246                                  MOV     R2,-(SP)
064754  010146                                  MOV     R1,-(SP)                        ; NIB.PTR,*
064756  042716  177770                          BIC     #177770,(SP)
064762  012746  000001                          MOV     #1,-(SP)
064766  005046                                  CLR     -(SP)
064770  004767  116640                          JSR     PC,BL$GT2
064774  062706  000010                          ADD     #10,SP
065000  005700                                  TST     R0
065002  001027                                  BNE     20$
065004  005205                                  INC     R5                              ; NIB.TSTED                     8211
065006  010146                                  MOV     R1,-(SP)                        ; NIB.PTR,*                     8212
065010  016646  000004                          MOV     4(SP),-(SP)                     ; BG.PAT,*
065014  012746  000012                          MOV     #12,-(SP)
065020  060616                                  ADD     SP,(SP)                         ; RESULT,*
065022  004767  134044                          JSR     PC,XOR.LNG.WRD
065026  016602  000012                          MOV     12(SP),R2                       ; RESULT,*                      8214
065032  042702  177760                          BIC     #177760,R2
065036  001002                                  BNE     18$
065040  005204                                  INC     R4                              ; ALL.BAD                       8216
065042  000405                                  BR      19$                             ;                               8214
065044  020227  000017                  18$:    CMP     R2,#17                          ;                               8219
065050  001402                                  BEQ     19$
065052  005266  000006                          INC     6(SP)                           ; SUM.BAD
065056  062706  000006                  19$:    ADD     #6,SP                           ;                               8210
065062  005201                          20$:    INC     R1                              ; NIB.PTR                       8206
065064  020127  000010                          CMP     R1,#10                          ; NIB.PTR,*
065070  003722                                  BLE     17$
065072  005203                                  INC     R3                              ; WD.CNT                        8199
065074  020327  000160                          CMP     R3,#160                         ; WD.CNT,*
065100  003662                                  BLE     12$
065102  104467                                  TRAP    67                              ;                               8224
065104  006000                                  ROR     R0
065106  103615                                  BLO     7$
065110  020504                                  CMP     R5,R4                           ; NIB.TSTED,ALL.BAD             8228
065112  001037                                  BNE     21$
065114  104455                                  TRAP    55                              ;                               8231
065116  000124                                  .WORD   124
065120  012750                                  .WORD   SYNC
065122  026302                                  .WORD   DUMPER
065124  012746  010730                          MOV     #WRD.19,-(SP)                   ;                               8232
065130  012746  012216                          MOV     #FNC.5,-(SP)
065134  012746  010766                          MOV     #WRD.23,-(SP)
065140  012746  010650                          MOV     #WRD.12,-(SP)
065144  012746  010616                          MOV     #WRD.9,-(SP)
065150  012746  011676                          MOV     #PHR.4,-(SP)
065154  012746  010752                          MOV     #WRD.22,-(SP)
065160  012746  010342                          MOV     #SEV.FMT,-(SP)
065164  012746  000010                          MOV     #10,-(SP)
065170  010600                                  MOV     SP,R0                           ; SP,*
065172  104414                                  TRAP    14
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

 065174  016700  130630                         MOV     ML.LUN,R0                       ;                                8233
 065200  104451                                 TRAP    51
 065202  104444                                 TRAP    44
 065204  062706  000022                         ADD     #22,SP                          ;                                8230
 065210  000432                                 BR      22$                             ;                                8228
 065212  005716                         21$:    TST     (SP)                            ; SUM.BAD                        8238
 065214  003430                                 BLE     22$
 065216  104455                                 TRAP    55                              ;                                8241
 065220  000125                                 .WORD   125
 065222  013114                                 .WORD   INTER
 065224  026302                                 .WORD   DUMPER
 065226  012746  010730                         MOV     #WRD.19,-(SP)                   ;                                8242
 065232  012746  012216                         MOV     #FNC.5,-(SP)
 065236  012746  010766                         MOV     #WRD.23,-(SP)
 065242  012746  010650                         MOV     #WRD.12,-(SP)
 065246  012746  010616                         MOV     #WRD.9,-(SP)
 065252  012746  011676                         MOV     #PHR.4,-(SP)
 065256  012746  010322                         MOV     #SIX.FMT,-(SP)
 065262  012746  000007                         MOV     #7,-(SP)
 065266  010600                                 MOV     SP,R0                           ; SP,*
 065270  104414                                 TRAP    14
 065272  062706  000020                         ADD     #20,SP                          ;                                8240
 065276  062706  000010                 22$:    ADD     #10,SP                          ;                                8121
 065302  000207                                 RTS     PC

                                        ; Routine Size:  255 words
                                        ; Maximum stack depth per invocation:  19 words



                                                .SBTTL  T33 TEST CODE SECTION
 065304                                 T33::
 065304  004767  176776                 1$:     JSR     PC,$T33                         ;                                8243
 065310  104466                                 TRAP    66
 065312  006000                                 ROR     R0
 065314  103773                                 BLO     1$
 065316  000207                                 RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
18202
18203
18204 ;          8246  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (86)

```
18206 ;ML4AD
18207 ;                 TEST CODE SECTION
18208
18209 ;          8247  !
18210 ;          8248  !
18211 ;          8249  BGNTST;
18212 ;          8250
18213 ;          8251  !++
18214 ;          8252  ! TEST NUMBER:  TST 34
18215 ;          8253  !
18216 ;          8254  ! TEST NAME:    SYNC DATA BUS CONTINUITY TEST (WRITE PATH)
18217 ;          8255  !
18218 ;          8256  ! TEST DESCRIPTION:
18219 ;          8257  !
18220 ;          8258  !       TEST THE CONTINUITY OF THE
18221 ;          8259  !       SYNCHRONOUS MODULE WRITE PATH
18222 ;          8260  !       DATA BUS BY:
18223 ;          8261  !
18224 ;          8262  !       1.  VIA DAT_DM MODE WRITE A
18225 ;          8263  !           BACKGROUND PATTERN OF ONES
18226 ;          8264  !           INTO THE GOOD BLOCK.
18227 ;          8265  !
18228 ;          8266  !       2.  VIA MBUS WRITE FUNCTION
18229 ;          8267  !           WRITE A ZEROES PATTERN INTO
18230 ;          8268  !           THE GOOD BLOCK.
18231 ;          8269  !
18232 ;          8270  !       3.  VIA DAT_DM MODE READ GOOD
18233 ;          8271  !           NIBBLES IN THE GOOD BLOCK FOR
18234 ;          8272  !           ZEROES.
18235 ;          8273  !
18236 ;          8274  !       4.  REPEAT WITH COMPLIMENT
18237 ;          8275  !           DATA AND BACKGROUND PATTERNS.
18238 ;          8276  !
18239 ;          8277  ! IMPLICIT INPUTS:
18240 ;          8278  !
18241 ;          8279  !       PD_TEMP
18242 ;          8280  !
18243 ;          8281  !       A BIT VECTOR OF 16 BITS WHERE
18244 ;          8282  !       THE READ PROM DATA IS STORED
18245 ;          8283  !       AND ACCESSED FROM.
18246 ;          8284  !
18247 ;          8285  !       IO_BUF
18248 ;          8286  !
18249 ;          8287  !       A VECTOR OF 256 WORDS WHERE
18250 ;          8288  !       DATA FOR MBUS READS AND WRITE
18251 ;          8289  !       FUNCTION ARE FOUND.
18252 ;          8290  !
18253 ;          8291  !
18254 ;          8292  !--
18255 ;          8293
18256 ;          8294  local
18257 ;          8295      DODU_FLG,                   !DROP UNIT FLAG
18258 ;          8296      BG_PAT,                     !BACKGROUND PATTERN
18259 ;          8297      RESULT,                     !RESULTS FROM XOR
18260 ;          8298      TST_PAT;                    !TEST PATTERN
```

```
18262 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18263 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)
18264
18265 ;          8299
18266 ;          8300  CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
18267 ;          8301  DODO_FLG = ZERO;
18268 ;          8302  BG_PAT = ZEROES;                        !BG PAT EQL 0'S
18269 ;          8303  TST_PAT = ONES;                         !TST PAT EQL 1'S
18270 ;          8304
18271 ;          8305  incr TWICE from 0 to 1 do               !REPEAT LOOP TWICE
18272 ;          8306      begin
18273 ;          8307      BGNSUB;
18274 ;          8308      CLR_MBUS;
18275 ;          8309      MLDT = .BG_PAT;                     !LOAD DATA DIAG REG WITH BG PAT
18276 ;          8310      MLD2 = .BG_PAT;
18277 ;          8311      MLE2 = .BG_PAT;
18278 ;          8312      DAT_DM_XFER ();                     !SET UP A DATA DIAG XFERR AT THE GOOD BLK
18279 ;          8313      MLCS1 = write;                      !DO A WRITE FUNCTION
18280 ;          8314
18281 ;          8315      incr WD_CNT from 0 to 127 do        !LOAD BLOCK WITH BG PAT
18282 ;          8316          begin
18283 ;          8317          DELAY (ONE_US);
18284 ;          8318          DAT_CLK = ONE;
18285 ;          8319          end;
18286 ;          8320
18287 ;          8321      CLR_MBUS;
18288 ;          8322      BAI = ONE;                          !SET ON FIRST IO_BUF ADRS
18289 ;          8323      IO_BUF = .TST_PAT;                  !FIRST IO_BUF WORD EQL'S TST_PAT
18290 ;          8324      GD_BLK_XFER ();                     !SET UP A GOOD BLOCK XFERR
18291 ;          8325      MLCS1 = write;                      !DO A WRITE FUNCTION
18292 ;          8326      TIME_OUT_LOOP;
18293 ;          8327      CLR_MBUS;
18294 ;          8328      DAT_DM_XFER ();                     !SET UP A DATA DIAG XFERR AT SAME BLOCK
18295 ;          8329      MLCS1 = read;                       !DO A READ FUNCTION
18296 ;          8330      DELAY (ONE_US);
18297 ;          8331
18298 ;          8332      incr WD_CNT from 0 to 112 do        !READ 113 LONG WORDS
18299 ;          8333          begin
18300 ;          8334          PD_TEMP = .MLPD;                !GET THE PROM DATA
18301 ;          8335          DAT_CLK = ONE;                  !CLOCK OUT THE DATA WORD
18302 ;          8336          DELAY (ONE_US);
18303 ;          8337          RD_LNG_WRD;                     !READ THE DATA WORD
18304 ;          8338
18305 ;          8339          incr NIB_PTR from 0 to 8 do     !LOOK AT 9 NIBBLES
18306 ;          8340
18307 ;          8341              if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
18308 ;          8342              then
18309 ;          8343                  begin
18310 ;          8344                  XOR_LNG_WRD (.NIB_PTR, .TST_PAT, RESULT);       !XOR NIBBLE DATA WITH TST_PAT
18311 ;          8345
18312 ;          8346                  if .RESULT<0, 4> neq ZERO       !SEE IF EQUAL
18313 ;          8347                  then
18314 ;          8348                      begin                       !ERROR IF NEQ
18315 ;          8349                      CMP_THRESHOLD;              !COMPARE ERROR PRINT THRESHOLD
18316 ;          8350                      ERRDF (86, SYNC, DUMPER);
```

```
 18318 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 18319 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)
 18320
 18321 ;          8351                    PRINTB (FIV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, FNC_5);
 18322 ;          8352                    PRINTB (FMT_5, .TST_PAT, .RESULT, .NIB_PTR);
 18323 ;          8353                    DODU_FLG = ONE;
 18324 ;          8354                    end
 18325 ;          8355
 18326 ;          8356                end
 18327 ;          8357
 18328 ;          8358            end;
 18329 ;          8359
 18330 ;          8360        ENDSUB;
 18331 ;          8361
 18332 ;          8362        if .DODU_FLG IS_SET                 !DROP THIS UNIT IF DODU IS_SET
 18333 ;          8363                                            !AND EXITS TEST
 18334 ;          8364        then
 18335 ;          8365            begin
 18336 ;          8366            DODU (.ML_LUN);
 18337 ;          8367            DOCLN;
 18338 ;          8368            end;
 18339 ;          8369
 18340 ;          8370        BG_PAT = not .BG_PAT;               !COMPLIMENT BG_PAT
 18341 ;          8371        TST_PAT = not .TST_PAT;             !COMPLIMENT TST_PAT AND REPEAT
 18342 ;          8372        end;
 18343 ;          8373
 18344 ;          8374    ENDTST;
 18348
 18349                                       .SBTTL  $T34 TEST CODE SECTION
 18353 065320  004167  117266          $T34: JSR     R1,$SAVE5                 ;                          8245
 18354 065324  024646                      CMP     -(SP),-(SP)
 18355 065326  005067  130044              CLR     P.CNT                     ;                          8298
 18356 065332  005046                      CLR     -(SP)                     ; DODU.FLG                 8301
 18357 065334  005001                      CLR     R1                        ; BG.PAT                   8302
 18358 065336  012702  177777              MOV     #-1,R2                    ; *,TST.PAT                8303
 18359 065342  005046                      CLR     -(SP)                     ; TWICE                    8305
 18360 065344  104402                1$:   TRAP    2                         ;                          8306
 18361 065346  152777  000040  130070      BISB    #40,@ML.REG+40            ;                          8307
 18362 065354  016705  130452              MOV     ML.DUT,R5
 18363 065360  042705  177770              BIC     #177770,R5
 18364 065364  142777  000007  130052      BICB    #7,@ML.REG+40
 18365 065372  150577  130046              BISB    R5,@ML.REG+40
 18366 065376  010177  130172              MOV     R1,@ML.REG+170            ; BG.PAT,*                 8309
 18367 065402  010177  130176              MOV     R1,@ML.REG+200            ; BG.PAT,*                 8310
 18368 065406  010177  130152              MOV     R1,@ML.REG+160            ; BG.PAT,*                 8311
 18369 065412  004767  130774              JSR     PC,DAT.DM.XFER            ;                          8312
 18370 065416  012777  000061  127760      MOV     #61,@ML.REG               ;                          8313
 18371 065424  005003                      CLR     R3                        ; WD.CNT                   8315
 18372 065426  012704  000001          2$: MOV     #1,R4                     ; *,$STMP2                 8317
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

065432  001411                          3$:     BEQ     6$
065434  016705  114456                          MOV     L$DLY,R5                        ; * $$TMP1
065440  001404                                  BEQ     5$
065442  005066  000006                  4$:     CLR     6(SP)                           ; $$TMP
065446  005305                                  DEC     R5                              ; $$TMP1
065450  001374                                  BNE     4$
065452  005304                          5$:     DEC     R4                              ; $$TMP2
065454  000766                                  BR      3$
065456  152777  000020  130040          6$:     BISB    #20,@ML.REG+120                 ;                                       8318
065464  005203                                  INC     R3                              ; WD.CNT                                8315
065466  020327  000177                          CMP     R3,#177                         ; WD.CNT,*
065472  003755                                  BLE     2$
065474  152777  000040  127742                  BISB    #40,@ML.REG+40                  ;                                       8319
065502  016705  130324                          MOV     ML.DUT,R5
065506  042705  177770                          BIC     #177770,R5
065512  142777  000007  127724                  BICB    #7,@ML.REG+40
065520  150577  127720                          BISB    R5,@ML.REG+40
065524  152777  000010  127712                  BISB    #10,@ML.REG+40                  ;                                       8322
065532  010267  126264                          MOV     R2,IO.BUF                       ; TST.PAT,*                             8323
065536  004767  132550                          JSR     PC,GD.BLK.XFER                  ;                                       8324
065542  012777  000061  127634                  MOV     #61,@ML.REG                     ;                                       8325
065550  105777  127700                  7$:     TSTB    @ML.REG+50
065554  100375                                  BPL     7$
065556  152777  000040  127660                  BISB    #40,@ML.REG+40                  ;                                       8326
065564  016705  130242                          MOV     ML.DUT,R5
065570  042705  177770                          BIC     #177770,R5
065574  142777  000007  127642                  BICB    #7,@ML.REG+40
065602  150577  127636                          BISB    R5,@ML.REG+40
065606  004767  130600                          JSR     PC,DAT.DM.XFER                  ;                                       8328
065612  012777  000071  127564                  MOV     #71,@ML.REG                     ;                                       8329
065620  012704  000001                          MOV     #1,R4                           ; *,$$TMP2                              8330
065624  001411                          8$:     BEQ     11$
065626  016705  114264                          MOV     L$DLY,R5                        ; *,$$TMP1
065632  001404                                  BEQ     10$
065634  005066  000006                  9$:     CLR     6(SP)                           ; $$TMP
065640  005305                                  DEC     R5                              ; $$TMP1
065642  001374                                  BNE     9$
065644  005304                          10$:    DEC     R4                              ; $$TMP2
065646  000766                                  BR      8$
065650  005003                          11$:    CLR     R3                              ; WD.CNT                                8332
065652  017767  127756  127462          12$:    MOV     @ML.REG+230,PD.TEMP             ;                                       8334
065660  152777  000020  127636                  BISB    #20,@ML.REG+120                 ;                                       8335
065666  012704  000001                          MOV     #1,R4                           ; *,$$TMP2                              8336
065672  001411                          13$:    BEQ     16$
065674  016705  114216                          MOV     L$DLY,R5                        ; *,$$TMP1
065700  001404                                  BEQ     15$
065702  005066  000006                  14$:    CLR     6(SP)                           ; $$TMP
065706  005305                                  DEC     R5                              ; $$TMP1
065710  001374                                  BNE     14$
065712  005304                          15$:    DEC     R4                              ; $$TMP2
065714  000766                                  BR      13$
065716  017767  127652  125450          16$:    MOV     @ML.REG+170,D1.TEMP
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

065724  017767  127654  125444                MOV     @ML.REG+200,D2.TEMP
065732  017767  127626  125440                MOV     @ML.REG+160,E2.TEMP
065740  005004                                CLR     R4                      ; NIB.PTR                       8339
065742  010405                          17$:  MOV     R4,R5                   ; NIB.PTR,*                     8341
065744  006205                                ASR     R5
065746  006205                                ASR     R5
065750  006205                                ASR     R5
065752  062705  015342                        ADD     #PD.TEMP,R5
065756  010546                                MOV     R5,-(SP)
065760  010446                                MOV     R4,-(SP)                ; NIB.PTR,*
065762  042716  177770                        BIC     #177770,(SP)
065766  012746  000001                        MOV     #1,-(SP)
065772  005046                                CLR     -(SP)
065774  004767  115634                        JSR     PC,BL$GT2
066000  062706  000010                        ADD     #10,SP
066004  005700                                TST     R0
066006  001071                                BNE     20$
066010  010446                                MOV     R4,-(SP)                ; NIB.PTR,*                     8344
066012  010246                                MOV     R2,-(SP)                ; TST.PAT,*
066014  012746  000012                        MOV     #12,-(SP)
066020  060616                                ADD     SP,(SP)                 ; RESULT,*
066022  004767  133044                        JSR     PC,XOR.LNG.WRD
066026  032766  000017  000012                BIT     #17,12(SP)              ; *,RESULT                      8346
066034  001454                                BEQ     19$
066036  005267  127334                        INC     P.CNT                   ;                               8348
066042  026767  127330  127330                CMP     P.CNT,LIMIT
066050  003403                                BLE     18$
066052  062706  000006                        ADD     #6,SP
066056  000451                                BR      21$
066060  104455                          18$:  TRAP    55                      ;                               8350
066062  000126                                .WORD   126
066064  012750                                .WORD   SYNC
066066  026302                                .WORD   DUMPER
066070  012746  012216                        MOV     #FNC.5,-(SP)            ;                               8351
066074  012746  010650                        MOV     #WRD.12,-(SP)
066100  012746  010630                        MOV     #WRD.10,-(SP)
066104  012746  011002                        MOV     #WRD.25,-(SP)
066110  012746  010774                        MOV     #WRD.24,-(SP)
066114  012746  010304                        MOV     #FIV.FMT,-(SP)
066120  012746  000006                        MOV     #6,-(SP)
066124  010600                                MOV     SP,R0                   ; SP,*
066126  104414                                TRAP    14
066130  010416                                MOV     R4,(SP)                 ; NIB.PTR,*                     8352
066132  016646  000030                        MOV     30(SP),-(SP)            ; RESULT,*
066136  010246                                MOV     R2,-(SP)                ; TST.PAT,*
066140  012746  006650                        MOV     #FMT.5,-(SP)
066144  012746  000004                        MOV     #4,-(SP)
066150  010600                                MOV     SP,R0                   ; SP,*
066152  104414                                TRAP    14
066154  012766  000001  000036                MOV     #1,36(SP)               ; *,DODU.FLG                    8353
066162  062706  000026                        ADD     #26,SP                  ;                               8348
066166  062706  000006                  19$:  ADD     #6,SP                   ;                               8343
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

066172  005204                          20$:    INC     R4                      ; NIB.PTR                                8339
066174  020427  000010                          CMP     R4,#10                  ; NIB.PTR,*
066200  003660                                  BLE     17$
066202  005203                          21$:    INC     R3                      ; WD.CNT                                 8332
066204  020327  000160                          CMP     R3,#160                 ; WD.CNT,*
066210  003620                                  BLE     12$
066212  104467                                  TRAP    67                      ;                                        8358
066214  006000                                  ROR     R0
066216  103002                                  BHIS    23$
066220  000167  177120                  22$:    JMP     1$
066224  026627  000002  000001          23$:    CMP     2(SP),#1                ; DODU.FLG,*                             8362
066232  001004                                  BNE     24$
066234  016700  127570                          MOV     ML.LUN,R0               ;                                        8366
066240  104451                                  TRAP    51
066242  104444                                  TRAP    44
066244  005101                          24$:    COM     R1                      ; BG.PAT                                 8370
066246  005102                                  COM     R2                      ; TST.PAT                                8371
066250  005216                                  INC     (SP)                    ; TWICE                                  8305
066252  021627  000001                          CMP     (SP),#1                 ; TWICE,*
066256  003760                                  BLE     22$
066260  062706  000010                          ADD     #10,SP                  ;                                        8245
066264  000207                                  RTS     PC

                                        ; Routine Size:  243 words
                                        ; Maximum stack depth per invocation:  24 words



                                                .SBTTL  T34 TEST CODE SECTION
066266                                  T34::
066266  004767  177026                  1$:     JSR     PC,$T34                 ;                                        8372
066272  104466                                  TRAP    66
066274  006000                                  ROR     R0
066276  103773                                  BLO     1$
066300  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
18542 ;ML4AD                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18543 ;                TEST CODE SECTION        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)
18544
18545 ;          8375  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 '87)

;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 35
;               !
;               ! TEST NAME:    SYNC DATA BUS CONIINUITY /READ PATH
;               !
;               ! TEST DESCRIPTION:
;               !       TEST THE CONITNUITY OF THE SYNCHRONOUS MODULE READ
;               !       DATA BUS BY:
;               !
;               !       1.  VIA MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
;               !
;               !       2.  VIA MBUS READ FUNCTION READ THE GOOD BLOCK FOR ONES.
;               !
;               !       3.  REPEAT WITH COMPLIMENT DATA PATTERN.
;               !
;               ! IMPLICIT INPUTS:
;               !       IO_BUF
;               !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
;               !       FUNCTION ARE FOUND.
;               !--
;
;               local
;                   DODU_FLG,                                   !DROP UNIT FLAG
;                   TST_PAT,                                    !TEST PATTERN
;                   BG_PAT;                                     !BACKGROUND PATTERN
;
;               CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;               DODU_FLG = ZERO;
;               TST_PAT = ONES;
;               BG_PAT = ZEROES;
;
;               incr TWICE from 0 to 1 do                       !REPEAT LOOP TWICE
;                   begin
;                   CLR_MBUS;
;                   BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
;                   IO_BUF = .TST_PAT;                          !FIRST IO_BUF ADRS GET TST PAT
;                   GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
;                   MLCS1 = write;                              !DO A WRITE FUNCTION (WRITES THE TST_PAT)
;                   TIME_OUT_LOOP;
;                   BGNSUB;
;                   CLR_MBUS;
;
;                   incr IO_CNT from 0 to 255 do                !LOAD IO_BUF WITH BG PAT
;                       IO_BUF [.IO_CNT] = .BG_PAT;
;
;                   GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
;                   MLCS1 = read;                               !DO A READ FUNCTION (READ THE TST PAT)
;                   TIME_OUT_LOOP;
;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (87)

;          8428      incr IO_CNT from 0 to 255 do                !READ THE IO_BUF FOR TEST PATTERN
;          8429
;          8430          if .IO_BUF [.IO_CNT] neq .TST_PAT       !SEE IF IO_BUF WORD EQLS TST PAT
;          8431          then
;          8432              begin                               !ERROR AND SET DODU_FLG IF NEQ
;          8433              CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;          8434              ERRDF (87, SYNC, DUMPER);
;          8435              PRINTB (SEV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, WRD_23, FNC_6, WRD_19);
;          8436              PRINTB (FMT_2, .TST_PAT, .IO_BUF [.IO_CNT], (.TST_PAT xor .IO_BUF [.IO_CNT]));
;          8437              DODU_FLG = ONE;
;          8438              end;
;          8439
;          8440      ENDSUB;
;          8441
;          8442      if .DODU_FLG IS_SET                         !DROP THIS UNIT IF DODU_FLG IS SET
;          8443      then
;          8444          begin
;          8445          DODU (.ML_LUN);
;          8446          DOCLN;
;          8447          end;
;          8448
;          8449      TST_PAT = not .TST_PAT;                     !COMPLIMENT TST_PAT
;          8450      BG_PAT = not .BG_PAT;                       !COMPLIMENT BG_PAT AND REPEAT
;          8451      end;
;          8452
;          8453  ENDTST;

                                        .SBTTL  $T35 TEST CODE SECTION
066302  004167  116304          $T35:   JSR     R1,$SAVE5                       ;                                   8374
066306  005067  127064                  CLR     P.CNT                           ;                                   8403
066312  005046                          CLR     -(SP)                           ; DODU.FLG                          8406
066314  012701  177777                  MOV     #-1,R1                          ; *,TST.PAT                         8407
066320  005004                          CLR     R4                              ; BG.PAT                            8408
066322  005005                          CLR     R5                              ; TWICE                             8410
066324  152777  000040  127112  1$:     BISB    #40,@ML.REG+40                  ;                                   8411
066332  016703  127474                  MOV     ML.DUT,R3
066336  042703  177770                  BIC     #177770,R3
066342  142777  000007  127074          BICB    #7,@ML.REG+40
066350  150377  127070                  BISB    R3,@ML.REG+40
066354  152777  000010  127062          BISB    #10,@ML.REG+40                  ;                                   8413
066362  010167  125434                  MOV     R1,IO.BUF                       ; TST.PAT,*                         8414
066366  004767  131720                  JSR     PC,GD.BLK.XFER                  ;                                   8415
066372  012777  000061  127004          MOV     #61,@ML.REG                     ;                                   8416
066400  105777  127050          2$:     TSTB    @ML.REG+50
066404  100375                          BPL     2$
066406  104402                  3$:     TRAP    2                               ;                                   8417
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

066410  152777  000040  127026          BISB    #40,@ML.REG+40          ;                                       8418
066416  016703  127410                  MOV     ML.DUT,R3
066422  042703  177770                  BIC     #177770,R3
066426  142777  000007  127010          BICB    #7,@ML.REG+40
066434  150377  127004                  BISB    R3,@ML.REG+40
066440  005002                          CLR     R2                      ; IO.CNT                                8421
066442  010203                  4$:     MOV     R2,R3                   ; IO.CNT,*                              8422
066444  006303                          ASL     R3
066446  010463  014022                  MOV     R4,IO.BUF(R3)           ; BG.PAT,*
066452  005202                          INC     R2                      ; IO.CNT                                8421
066454  020227  000377                  CMP     R2,#377                 ; IO.CNT,*
066460  003770                          BLE     4$
066462  004767  131624                  JSR     PC,GD.BLK.XFER          ;                                       8424
066466  012777  000071  126710          MOV     #71,@ML.REG             ;                                       8425
066474  105777  126754          5$:     TSTB    @ML.REG+50
066500  100375                          BPL     5$
066502  005002                          CLR     R2                      ; IO.CNT                                8428
066504  010203                  6$:     MOV     R2,R3                   ; IO.CNT,*                              8430
066506  006303                          ASL     R3
066510  062703  014022                  ADD     #IO.BUF,R3
066514  021301                          CMP     (R3),R1                 ; *,TST.PAT
066516  001462                          BEQ     7$
066520  005267  126652                  INC     P.CNT                   ;                                       8432
066524  026767  126646  126646          CMP     P.CNT,LIMIT
066532  003060                          BGT     8$
066534  104455                          TRAP    55                      ;                                       8434
066536  000127                          .WORD   127
066540  012750                          .WORD   SYNC
066542  026302                          .WORD   DUMPER
066544  012746  010730                  MOV     #WRD.19,-(SP)           ;                                       8435
066550  012746  012226                  MOV     #FNC.6,-(SP)
066554  012746  010766                  MOV     #WRD.23,-(SP)
066560  012746  010650                  MOV     #WRD.12,-(SP)
066564  012746  010630                  MOV     #WRD.10,-(SP)
066570  012746  011002                  MOV     #WRD.25,-(SP)
066574  012746  010774                  MOV     #WRD.24,-(SP)
066600  012746  010342                  MOV     #SEV.FMT,-(SP)
066604  012746  000010                  MOV     #10,-(SP)
066610  010600                          MOV     SP,R0                   ; SP,*
066612  104414                          TRAP    14
066614  011316                          MOV     (R3),(SP)               ;                                       8436
066616  010146                          MOV     R1,-(SP)                ; TST.PAT,*
066620  046616  000002                  BIC     2(SP),(SP)
066624  040166  000002                  BIC     R1,2(SP)                ; TST.PAT,*
066630  052616                          BIS     (SP)+,(SP)
066632  011346                          MOV     (R3),-(SP)
066634  010146                          MOV     R1,-(SP)                ; TST.PAT,*
066636  012746  006506                  MOV     #FMT.2,-(SP)
066642  012746  000004                  MOV     #4,-(SP)
066646  010600                          MOV     SP,R0                   ; SP,*
066650  104414                          TRAP    14
066652  012766  000001  000032          MOV     #1,32(SP)               ; *,DODU.FLG                            8437
```

```
18715                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
18716                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
18717
18718 066660  062706  000032                      ADD     #32,SP                  ;                                       8432
18719 066664  005202                    7$:       INC     R2                      ; IO.CNT                                8428
18720 066666  020227  000377                      CMP     R2,#377                 ; IO.CNT,*
18721 066672  003704                              BLE     6$
18722 066674  104467                    8$:       TRAP    67                      ;                                       8438
18723 066676  006000                              ROR     R0
18724 066700  103642                              BLO     3$
18725 066702  021627  000001                      CMP     (SP),#1                 ; DODU.FLG,*                            8442
18726 066706  001004                              BNE     9$
18727 066710  016700  127114                      MOV     ML.LUN,R0               ;                                       8445
18728 066714  104451                              TRAP    51
18729 066716  104444                              TRAP    44
18730 066720  005101                    9$:       COM     R1                      ; TST.PAT                               8449
18731 066722  005104                              COM     R4                      ; BG.PAT                                8450
18732 066724  005205                              INC     R5                      ; TWICE                                 8410
18733 066726  020527  000001                      CMP     R5,#1                   ; TWICE,*
18734 066732  003002                              BGT     10$
18735 066734  000167  177364                      JMP     1$
18736 066740  005726                    10$:      TST     (SP)+                   ;                                       8374
18737 066742  000207                              RTS     PC
18738
18739                                   ; Routine Size:  145 words
18740                                   ; Maximum stack depth per invocation:  20 words
18745
18746
18750
18751                                           .SBTTL  T35 TEST CODE SECTION
18755 066744                            T35::
18756 066744  004767  177332            1$:       JSR     PC,$T35                 ;                                       8451
18757 066750  104466                              TRAP    66
18758 066752  006000                              ROR     R0
18759 066754  103773                              BLO     1$
18760 066756  000207                              RTS     PC
18761
18762                                   ; Routine Size:  6 words
18763                                   ; Maximum stack depth per invocation:  0 words
18768
18769 ;         8454  !<BLF/PAGE>
```

```
18771 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18772 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
18773
18774 ;          8455  !
18775 ;          8456  !
18776 ;          8457  BGNTST;
18777 ;          8458
18778 ;          8459  !++
18779 ;          8460  ! TEST NUMBER:  TST 36
18780 ;          8461  !
18781 ;          8462  ! TEST NA'_:    RAM BUS ADRS COUNTER TEST /WRITE PATH
18782 ;          8463  !
18783 ;          8464  ! TEST DESCRIPTION:
18784 ;          8465  !
18785 ;          8466  !       TEST ABILITY OF THE RAM_BUS ADDRESS
18786 ;          8467  !       COUNTERS TO LOAD/UNLOAD THE SKIP
18787 ;          8468  !       RAM DURING WRITE FUNCTIONS BY:
18788 ;          8469  !
18789 ;          8470  !       1.  LOADING A REPEATING COUNT OF 0
18790 ;          8471  !           TO 63 INTO THE NIBBLES OF THE
18791 ;          8472  !           FIRST 64 WORDS OF THE IO_BUF.
18792 ;          8473  !
18793 ;          8474  !       2.  VIA MBUS WRITE FUNCTION WRITE
18794 ;          8475  !           THE CONTENTS OF THE IO_BUF
18795 ;          8476  !           INTO THE GOOD BLOCK.
18796 ;          8477  !
18797 ;          8478  !       3.  VIA DAT_DM READ GOOD NIBBLES IN
18798 ;          8479  !           THE GOOD BLOCK FOR THE UNBROKEN
18799 ;          8480  !           COUNT OF 0 TO 63.
18800 ;          8481  !
18801 ;          8482  !           ONCE A BAD NIBBLE IS ENCOUNTERED
18802 ;          8483  !           MASK THAT NIBBLE FROM FURTHER
18803 ;          8484  !           READS.
18804 ;          8485  !
18805 ;          8486  !       4.  REPEAT READING NIBBLES UNTIL
18806 ;          8487  !           113 WORDS ARE READ OR ALL 10 NIBBLES
18807 ;          8488  !           ARE MASKED.
18808 ;          8489  !
18809 ;          8490  ! IMPLICIT INPUTS:
18810 ;          8491  !
18811 ;          8492  !       PD_TEMP
18812 ;          8493  !
18813 ;          8494  !       A BIT VECTOR OF 16 BITS WHERE
18814 ;          8495  !       THE READ PROM DATA IS STORED
18815 ;          8496  !       AND ACCESSED FROM.
18816 ;          8497  !
18817 ;          8498  !       IO_BUF
18818 ;          8499  !       A VECTOR OF 256 WORDS WHERE
18819 ;          8500  !       DATA FOR MBUS READS AND WRITE
18820 ;          8501  !       FUNCTION ARE FOUND.
18821 ;          8502  !
18822 ;          8503  !--
18823 ;          8504
18824 ;          8505  local
18825 ;          8506      DODU_FLG,                  !DROP UNIT FLAG
```

```
18827 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18828 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
18829 ;
18830 ;          8507       WRD_CNT,                            !WORD COUNT
18831 ;          8508       NIB_IGNORE : bitvector [16],        !NIBBLE IGNORE FLAGS
18832 ;          8509       ERR_FLG,                            !ERROR FLAG
18833 ;          8510       BAD_NIB_CNT,                        !BAD NIBBLE COUNT
18834 ;          8511       PASS_CNT,                           !PASS COUNT
18835 ;          8512       NIB_PAT;                            !NIBBLE PATTERN
18836 ;          8513
18837 ;          8514   CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
18838 ;          8515   DODO_FLG = ZERO;
18839 ;          8516   WRD_CNT = ZERO;
18840 ;          8517
18841 ;          8518   incr CNT from 0 to 63 do                !LOAD 64 WORDS WITH REPEATING COUNTS OF 0-63
18842 ;          8519
18843 ;          8520       incr PAT_CNT from -1 to 11 by 4 do  !LOAD NIBBLES IN WORD WITH REPEATING COUNTS OF 0-63
18844 ;          8521           begin
18845 ;          8522           (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
18846 ;          8523           (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
18847 ;          8524           (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
18848 ;          8525           (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
18849 ;          8526           WRD_CNT = .WRD_CNT + 1;         !INCREMENT TO NEXT WORD
18850 ;          8527           end;
18851 ;          8528
18852 ;          8529   BGNSUB;
18853 ;          8530   CLR_MBUS;
18854 ;          8531   GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
18855 ;          8532   MLCS1 = write;                          !DO A WRITE FUNCTION
18856 ;          8533   TIME_OUT_LOOP;
18857 ;          8534   CLR_MBUS;
18858 ;          8535   NIB_IGNORE = ZEROES;
18859 ;          8536   PASS_CNT = ZEROES;
18860 ;          8537   NIB_PAT = ZEROES;
18861 ;          8538   BAD_NIB_CNT = ZEROES;
18862 ;          8539   DAT_DM_XFER ();                         !SET UP A DATA DIAG MODE AT THE GOOD BLOCK
18863 ;          8540   MLCS1 = read;                           !DO A READ FUNCTION
18864 ;          8541   DELAY (ONE_US);
18865 ;          8542
18866 ;          8543   do                                      !LOOP UNTIL THE BLOCK IS READ OR 9 BAD NIBBLES FOUND
18867 ;          8544       begin
18868 ;          8545       PD_TEMP = .MLPD;                    !GET THE PROM DATA
18869 ;          8546       DAT_CLK = ONE;                      !CLOCK OUT THE DATA WORD
18870 ;          8547       DELAY (ONE_US);
18871 ;          8548       RD_LNG_WRD;                         !READ THE DATA DIAG REGISTERS
18872 ;          8549
18873 ;          8550       incr NIB_PTR from 0 to 8 do         !LOOK AT 9 NIBBLES
18874 ;          8551           begin
18875 ;          8552
18876 ;          8553           if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
18877 ;          8554           then
18878 ;          8555               begin
18879 ;          8556
18880 ;          8557               if .NIB_IGNORE [.NIB_PTR] IS_NOT_SET    !SEE IF THIS NIBBLE FOUND BAD BEFORE
18881 ;          8558               then
```

```
 18883 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 18884 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
 18885
 18886 ;          8559                   begin
 18887 ;          8560                   TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);      !TEST THE NIBBLE IF NEVER FOUND BAD
 18888 ;          8561
 18889 ;          8562                   if .ERR_FLG IS_SET              !SEE IF TEST FOUND AN ERROR
 18890 ;          8563                   then
 18891 ;          8564                       begin                       !ERROR AND SET DODU_FLG IS SET
 18892 ;          8565                       CMP_THRESHOLD;              !COMPARE ERROR PRINT THRESHOLD
 18893 ;          8566                       ERRDF (88, ARR_DAT, DUMPER);
 18894 ;          8567                       PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_5, WRD_19);
 18895 ;          8568                       DODU_FLG = ONE;
 18896 ;          8569                       end
 18897 ;          8570
 18898 ;          8571                   end
 18899 ;          8572
 18900 ;          8573               end
 18901 ;          8574           else                                    !THIS NIBBLE IS BAD
 18902 ;          8575               begin
 18903 ;          8576               NIB_IGNORE [.NIB_PTR] = ONE;        !SET THIS NIBBLE NIB_IGNORE FLAG
 18904 ;          8577               BAD_NIB_CNT = .BAD_NIB_CNT + 1;     !INCREMENT BAD NIB COUNT
 18905 ;          8578               end;
 18906 ;          8579
 18907 ;          8580           NIB_PAT = .NIB_PAT + 1;                 !INCREMENT NIB PAT
 18908 ;          8581           end;
 18909 ;          8582
 18910 ;          8583       PASS_CNT = .PASS_CNT + 1;                   !INCREMENT PASS COUNT
 18911 ;          8584       end
 18912 ;          8585   until (.PASS_CNT eql 113) or (.BAD_NIB_CNT eql 9);      !REPEAT UNTIL COMPLETE
 18913 ;          8586
 18914 ;          8587   ENDSUB;
 18915 ;          8588
 18916 ;          8589   if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG SET
 18917 ;          8590   then
 18918 ;          8591       begin
 18919 ;          8592       DODU (.ML_LUN);
 18920 ;          8593       DOCLN;
 18921 ;          8594       end;
 18922 ;          8595
 18923 ;          8596   ENDTST;
 18927
 18928                                          .SBTTL  $T36 TEST CODE SECTION
 18932 066760  004167  115626          $T36:   JSR     R1,$SAVE5                       ;                                   8453
 18933 066764  162706  000006                  SUB     #6,SP
 18934 066770  005067  126402                  CLR     P.CNT                           ;                                   8512
 18935 066774  005046                          CLR     -(SP)                           ; DODU.FLG                          8515
 18936 066776  005003                          CLR     R3                              ; WRD.CNT                           8516
 18937 067000  005002                          CLR     R2                              ; CNT                               8518
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

067002  012700  177777                  1$:     MOV     #-1,R0                  ; *,PAT.CNT                     8520
067006  010301                          2$:     MOV     R3,R1                   ; WRD.CNT,*                     8522
067010  006301                                  ASL     R1
067012  062701  014022                          ADD     #IO.BUF,R1
067016  010005                                  MOV     R0,R5                   ; PAT.CNT,*
067020  005205                                  INC     R5
067022  042705  177760                          BIC     #177760,R5
067026  142711  000017                          BICB    #17,(R1)
067032  150511                                  BISB    R5,(R1)
067034  010005                                  MOV     R0,R5                   ; PAT.CNT,*                     8523
067036  062705  000002                          ADD     #2,R5
067042  006305                                  ASL     R5
067044  006305                                  ASL     R5
067046  006305                                  ASL     R5
067050  006305                                  ASL     R5
067052  042705  177417                          BIC     #177417,R5
067056  142711  000360                          BICB    #360,(R1)
067062  150511                                  BISB    R5,(R1)
067064  010005                                  MOV     R0,R5                   ; PAT.CNT,*                     8524
067066  062705  000003                          ADD     #3,R5
067072  000305                                  SWAB    R5
067074  042705  170377                          BIC     #170377,R5
067100  042711  007400                          BIC     #7400,(R1)
067104  050511                                  BIS     R5,(R1)
067106  010005                                  MOV     R0,R5                   ; PAT.CNT,*                     8525
067110  062705  000004                          ADD     #4,R5
067114  000305                                  SWAB    R5
067116  006305                                  ASL     R5
067120  006305                                  ASL     R5
067122  006305                                  ASL     R5
067124  006305                                  ASL     R5
067126  042705  007777                          BIC     #7777,R5
067132  042711  170000                          BIC     #170000,(R1)
067136  050511                                  BIS     R5,(R1)
067140  005203                                  INC     R3                      ; WRD.CNT                       8526
067142  062700  000004                          ADD     #4,R0                   ; *,PAT.CNT                     8520
067146  020027  000013                          CMP     R0,#13                  ; PAT.CNT,*
067152  003715                                  BLE     2$
067154  005202                                  INC     R2                      ; CNT                           8518
067156  020227  000077                          CMP     R2,#77                  ; CNT,*
067162  003707                                  BLE     1$
067164  104402                          3$:     TRAP    2                       ;                               8527
067166  152777  000040  126250                  BISB    #40,@ML.REG+40          ;                               8529
067174  016702  126632                          MOV     ML.DUT,R2
067200  042702  177770                          BIC     #177770,R2
067204  142777  000007  126232                  BICB    #7,@ML.REG+40
067212  150277  126226                          BISB    R2,@ML.REG+40
067216  004767  131070                          JSR     PC,GD.BLK.XFER          ;                               8531
067222  012777  000061  126154                  MOV     #61,@ML.REG             ;                               8532
067230  105777  126220                  4$:     TSTB    @ML.REG+50
067234  100375                                  BPL     4$
067236  152777  000040  126200                  BISB    #40,@ML.REG+40          ;                               8533
```

29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

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18995                                   ;ML4AD
18996                                   ;               TEST CODE SECTION
18997
18998 067244  016702  126562                     MOV     ML.DUT,R2
18999 067250  042702  177770                     BIC     #177770,R2
19000 067254  142777  000007  126162             BICB    #7,@ML.REG+40
19001 067262  150277  126156                     BISB    R2,@ML.REG+40
19002 067266  005066  000004                     CLR     4(SP)           ; NIB.IGNORE                    8535
19003 067272  005004                             CLR     R4              ; PASS.CNT                      8536
19004 067274  005003                             CLR     R3              ; NIB.PAT                       8537
19005 067276  005005                             CLR     R5              ; BAD.NIB.CNT                   8538
19006 067300  004767  127106                     JSR     PC,DAT.DM.XFER  ;                               8539
19007 067304  012777  000071  126072             MOV     #71,@ML.REG     ;                               8540
19008 067312  012701  000001                     MOV     #1,R1           ; *,$$TMP2                      8541
19009 067316  001411                     5$:     BEQ     8$
19010 067320  016702  112572                     MOV     L$DLY,R2        ; *,$$TMP1
19011 067324  001404                             BEQ     7$
19012 067326  005066  000006             6$:     CLR     6(SP)           ; $$TMP
19013 067332  005302                             DEC     R2              ; $$TMP1
19014 067334  001374                             BNE     6$
19015 067336  005301                     7$:     DEC     R1              ; $$TMP2
19016 067340  000766                             BR      5$
19017 067342  017767  126266  125772     8$:     MOV     @ML.REG+230,PD.TEMP     ;                       8545
19018 067350  152777  000020  126146             BISB    #20,@ML.REG+120 ;                               8546
19019 067356  012701  000001                     MOV     #1,R1           ; *,$$TMP2                      8547
19020 067362  001411                     9$:     BEQ     12$
19021 067364  016702  112526                     MOV     L$DLY,R2        ; *,$$TMP1
19022 067370  001404                             BEQ     11$
19023 067372  005066  000006             10$:    CLR     6(SP)           ; $$TMP
19024 067376  005302                             DEC     R2              ; $$TMP1
19025 067400  001374                             BNE     10$
19026 067402  005301                     11$:    DEC     R1              ; $$TMP2
19027 067404  000766                             BR      9$
19028 067406  017767  126162  123760     12$:    MOV     @ML.REG+170,D1.TEMP
19029 067414  017767  126164  123754             MOV     @ML.REG+200,D2.TEMP
19030 067422  017767  126136  123750             MOV     @ML.REG+160,E2.TEMP
19031 067430  005001                             CLR     R1              ; NIB.PTR                       8550
19032 067432  010100                     13$:    MOV     R1,R0           ; NIB.PTR,*                     8553
19033 067434  006200                             ASR     R0
19034 067436  006200                             ASR     R0
19035 067440  006200                             ASR     R0
19036 067442  012702  000004                     MOV     #4,R2           ;                               8557
19037 067446  060602                             ADD     SP,R2           ; NIB.IGNORE,*
19038 067450  060002                             ADD     R0,R2
19039 067452  010046                             MOV     R0,-(SP)        ;                               8553
19040 067454  062716  015342                     ADD     #PD.TEMP,(SP)
19041 067460  010146                             MOV     R1,-(SP)        ; NIB.PTR,*
19042 067462  042716  177770                     BIC     #177770,(SP)
19043 067466  012746  000001                     MOV     #1,-(SP)
19044 067472  005046                             CLR     -(SP)
19045 067474  004767  114134                     JSR     PC,BL$GT2
19046 067500  062706  000010                     ADD     #10,SP
19047 067504  005700                             TST     R0
19048 067506  001077                             BNE     16$
19049 067510  010246                             MOV     R2,-(SP)        ;                               8557
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

067512  010146                                  MOV     R1,-(SP)                        ; NIB.PTR,*
067514  042716  177770                          BIC     #177770,(SP)
067520  012746  000001                          MOV     #1,-(SP)
067524  005046                                  CLR     -(SP)
067526  004767  114102                          JSR     PC,BL$GT2
067532  062706  000010                          ADD     #10,SP
067536  005700                                  TST     R0
067540  001076                                  BNE     17$
067542  010146                                  MOV     R1,-(SP)                        ; NIB.PTR,*                     8560
067544  010346                                  MOV     R3,-(SP)                        ; NIB.PAT,*
067546  012746  000010                          MOV     #10,-(SP)
067552  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
067554  004767  130616                          JSR     PC,TST.LNG.WRD
067560  026627  000010  000001                  CMP     10(SP),#1                       ; ERR.FLG,*                     8562
067566  001044                                  BNE     15$
067570  005267  125602                          INC     P.CNT                           ;                               8564
067574  026767  125576  125576                  CMP     P.CNT,LIMIT
067602  003403                                  BLE     14$
067604  062706  000006                          ADD     #6,SP
067610  000457                                  BR      18$
067612  104455                          14$:    TRAP    55                              ;                               8566
067614  000130                                  .WORD   130
067616  013012                                  .WORD   ARR.DAT
067620  026302                                  .WORD   DUMPER
067622  012746  010730                          MOV     #WRD.19,-(SP)                   ;                               8567
067626  012746  012216                          MOV     #FNC.5,-(SP)
067632  012746  010650                          MOV     #WRD.12,-(SP)
067636  012746  010630                          MOV     #WRD.10,-(SP)
067642  012746  011270                          MOV     #WRD.50,-(SP)
067646  012746  012414                          MOV     #FNC.18,-(SP)
067652  012746  010322                          MOV     #SIX.FMT,-(SP)
067656  012746  000007                          MOV     #7,-(SP)
067662  010600                                  MOV     SP,R0                           ; SP,*
067664  104414                                  TRAP    14
067666  012766  000001  000026                  MOV     #1,26(SP)                       ; *,DODU.FLG                    8568
067674  062706  000020                          ADD     #20,SP                          ;                               8564
067700  062706  000006                  15$:    ADD     #6,SP                           ;                               8559
067704  000414                                  BR      17$                             ;                               8553
067706  010246                          16$:    MOV     R2,-(SP)                        ;                               8576
067710  010146                                  MOV     R1,-(SP)                        ; NIB.PTR,*
067712  042716  177770                          BIC     #177770,(SP)
067716  012746  000001                          MOV     #1,-(SP)
067722  011646                                  MOV     (SP),-(SP)
067724  004767  114142                          JSR     PC,BL$PU2
067730  005205                                  INC     R5                              ; BAD.NIB.CNT                   8577
067732  062706  000010                          ADD     #10,SP                          ;                               8575
067736  005203                          17$:    INC     R3                              ; NIB.PAT                       8580
067740  005201                                  INC     R1                              ; NIB.PTR                       8550
067742  020127  000010                          CMP     R1,#10                          ; NIB.PTR,*
067746  003631                                  BLE     13$
067750  005204                          18$:    INC     R4                              ; PASS.CNT                      8583
067752  020427  000161                          CMP     R4,#161                         ; PASS.CNT,*                    8585
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

 067756  001405                                 BEQ     19$
 067760  020527  000011                         CMP     R5,#11                          ; BAD.NIB.CNT,*
 067764  001402                                 BEQ     19$
 067766  000167  177350                         JMP     8$
 067772  104467                         19$:    TRAP    67
 067774  006000                                 ROR     R0
 067776  103002                                 BHIS    20$
 070000  000167  177160                         JMP     3$
 070004  021627  000001                 20$:    CMP     (SP),#1                         ; DODU.FLG,*                    8589
 070010  001004                                 BNE     21$
 070012  016700  126012                         MOV     ML.LUN,R0                       ;                               8592
 070016  104451                                 TRAP    51
 070020  104444                                 TRAP    44
 070022  062706  000010                 21$:    ADD     #10,SP                          ;                               8453
 070026  000207                                 RTS     PC

                                        ; Routine Size:  276 words
                                        ; Maximum stack depth per invocation:  21 words



                                                .SBTTL  T36 TEST CODE SECTION
 070030                                 T36::
 070030  004767  176724                 1$:     JSR     PC,$T36                         ;                               8594
 070034  104466                                 TRAP    66
 070036  006000                                 ROR     R0
 070040  103773                                 BLO     1$
 070042  000207                                 RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          8597  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)

;          8598  !
;          8599  !
;          8600  BGNTST;
;          8601
;          8602  !++
;          8603  ! TEST NUMBER:  TST 37
;          8604  !
;          8605  ! TEST NAME:    RAM BUS ADRS COUNTER TEST /READ PATH
;          8606  !
;          8607  ! TEST DESCRIPTION:
;          8608  !
;          8609  !       TEST ABILITY OF RAM/BUS ADRS
;          8610  !       COUNTERS TO LOAD/UNLOAD THE SKIP
;          8611  !       RAM DURING READ FUNCTIONS BY:
;          8612  !
;          8613  !       1.  LOADING A REPEATING COUNT OF 0
;          8614  !           TO 63 INTO THE NIBBLES OF THE
;          8615  !           FIRST 64 WORDS OF THE IO_BUF.
;          8616  !
;          8617  !       2.  VIA MBUS WRITE FUNCTION WRITE
;          8618  !           THE CONTENTS OF THE IO_BUF
;          8619  !           INTO THE GOOD BLOCK.
;          8620  !
;          8621  !       3.  CLEAR OUT THE IO_BUF
;          8622  !
;          8623  !       4.  VIA MBUS READ FUNCTION READ
;          8624  !           THE GOOD BLOCK FOR THE REPEATING
;          8625  !           COUNT OF 0 TO 63.
;          8626  !
;          8627  ! IMPLICIT INPUTS:
;          8628  !
;          8629  !       IO_BUF
;          8630  !
;          8631  !       A VECTOR OF 256 WORDS WHERE
;          8632  !       DATA FOR MBUS READS AND WRITE
;          8633  !       FUNCTION ARE FOUND.
;          8634  !
;          8635  !--
;          8636
;          8637  local
;          8638      DODU_FLG,                                   !DROP UNIT FLAG
;          8639      WRD_CNT,                                    !WORD COUNT
;          8640      PAT_INC,                                    !PATTERN INCREMENT
;          8641      SIZ_EXP,                                    !SIZE EXPRESSION
;          8642      POS_EXP,                                    !POSITIONAL EXPRESSION
;          8643      TEMP;                                       !TEMPORARY STORAGE LOCATION
;          8644
;          8645  CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;          8646  CLR_MBUS;
;          8647  DODU_FLG = ZERO;
;          8648  WRD_CNT = ZERO;
;          8649
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)

;       8650    incr COUNT from 0 to 63 do                      !LOAD 64 WORDS WITH REPEATING  COUNTS OF 0-63
;       8651
;       8652        incr PAT_CNT from -1 to 11 by 4 do          !LOAD NIBBLES IN WORD WITH REPEATING COUNT OF 0-63
;       8653            begin
;       8654            (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
;       8655            (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
;       8656            (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
;       8657            (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
;       8658            WRD_CNT = .WRD_CNT + 1;                 !INCREMENT TO NEXT WORD
;       8659            end;
;       8660
;       8661    GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK XFERR
;       8662    MLCS1 = write;                                  !DO A WRITE FUNCTION
;       8663    TIME_OUT_LOOP;
;       8664    BGNSUB;
;       8665
;       8666    incr IO_CNT from 0 to 255 do                    !CLEAR OUT IO_BUF
;       8667        IO_BUF [.IO_CNT] = ZEROES;
;       8668
;       8669    CLR_MBUS;
;       8670    GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK XFERR
;       8671    MLCS1 = read;                                   !DO A READ FUNCTION
;       8672    TIME_OUT_LOOP;
;       8673    CLR_MBUS;
;       8674    SIZ_EXP = 4;                                    !FIELD SIZE FOR NIBBLES ALWAYS 4 BITS
;       8675    WRD_CNT = 0;
;       8676
;       8677    incr COUNT from 0 to 63 do                      !READ 64 WORDS IN IO_BUF
;       8678
;       8679        incr PAT_CNT from -1 to 11 by 4 do          !READ REPEATING COUNTS OF 0-63
;       8680            begin
;       8681            POS_EXP = ZERO;                         !FIELD SELECTOR SELECTS THE FOUR NIBBLES
;       8682            PAT_INC = ONE;
;       8683            TEMP = .IO_BUF [.WRD_CNT];              !GET A WORD OUT OF IO_BUF
;       8684
;       8685            incr CNT from 0 to 3 do                 !READ THE FOUR NIBBLES IN WORD
;       8686                begin
;       8687
;       8688                if .TEMP<.POS_EXP, .SIZ_EXP> neq (.PAT_CNT + .PAT_INC)
;       8689                                                    !COMPARE NIBBLE WITH RESPECTIVE 0 -63 CNT
;       8690                then
;       8691                    begin                           !ERROR AND SET DODU_FLG IF NEQ
;       8692                    CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
;       8693                    ERRDF (89, ARR_DAT, DUMPER);
;       8694                    PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_6, WRD_19);
;       8695                    DODU_FLG = ONE;
;       8696                    end;
;       8697
;       8698                POS_EXP = .POS_EXP + 4;             !POINT TO THE NEXT NIBBLE IN WORD
;       8699                PAT_INC = .PAT_INC + 1;             !INCREMENT THE 0-63 COUNT
;       8700                end;
;       8701
```

```
 19271 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 19272 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)
 19273
 19274 ;          8702          WRD_CNT = .WRD_CNT + 1;          !GET THE NEXT IO_BUF WORD
 19275 ;          8703          end;
 19276 ;          8704
 19277 ;          8705    ENDSUB;
 19278 ;          8706
 19279 ;          8707    if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG SET
 19280 ;          8708    then
 19281 ;          8709        begin
 19282 ;          8710        DODU (.ML_LUN);
 19283 ;          8711        DOCLN;
 19284 ;          8712        end;
 19285 ;          8713
 19286 ;          8714    ENDTST;
 19290
 19291                                          .SBTTL  $T37 TEST CODE SECTION
 19295 070044  004167  114542          $T37:   JSR     R1,$SAVE5                ;                          8596
 19296 070050  162706  000012                  SUB     #12,SP
 19297 070054  005067  125316                  CLR     P.CNT                    ;                          8643
 19298 070060  152777  000040  125356          BISB    #40,@ML.REG+40           ;                          8645
 19299 070066  016705  125740                  MOV     ML.DUT,R5
 19300 070072  042705  177770                  BIC     #177770,R5
 19301 070076  142777  000007  125340          BICB    #7,@ML.REG+40
 19302 070104  150577  125334                  BISB    R5,@ML.REG+40
 19303 070110  005066  000010                  CLR     10(SP)                   ; DODU.FLG                 8647
 19304 070114  005066  000002                  CLR     2(SP)                    ; WRD.CNT                  8648
 19305 070120  005002                          CLR     R2                       ; COUNT                    8650
 19306 070122  012703  177777          1$:     MOV     #-1,R3                   ; *,PAT.CNT                8652
 19307 070126  016604  000002          2$:     MOV     2(SP),R4                 ; WRD.CNT,*                8654
 19308 070132  006304                          ASL     R4
 19309 070134  062704  014022                  ADD     #IO.BUF,R4
 19310 070140  010305                          MOV     R3,R5                    ; PAT.CNT,*
 19311 070142  005205                          INC     R5
 19312 070144  042705  177760                  BIC     #177760,R5
 19313 070150  142714  000017                  BICB    #17,(R4)
 19314 070154  150514                          BISB    R5,(R4)
 19315 070156  010305                          MOV     R3,R5                    ; PAT.CNT,*                8655
 19316 070160  062705  000002                  ADD     #2,R5
 19317 070164  006305                          ASL     R5
 19318 070166  006305                          ASL     R5
 19319 070170  006305                          ASL     R5
 19320 070172  006305                          ASL     R5
 19321 070174  042705  177417                  BIC     #177417,R5
 19322 070200  142714  000360                  BICB    #360,(R4)
 19323 070204  150514                          BISB    R5,(R4)
 19324 070206  010305                          MOV     R3,R5                    ; PAT.CNT,*                8656
 19325 070210  062705  000003                  ADD     #3,R5
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

070214  000305                                  SWAB    R5
070216  042705  170377                          BIC     #170377,R5
070222  042714  007400                          BIC     #7400,(R4)
070226  050514                                  BIS     R5,(R4)
070230  010305                                  MOV     R3,R5                   ; PAT.CNT,*                     8657
070232  062705  000004                          ADD     #4,R5
070236  000305                                  SWAB    R5
070240  006305                                  ASL     R5
070242  006305                                  ASL     R5
070244  006305                                  ASL     R5
070246  006305                                  ASL     R5
070250  042705  007777                          BIC     #7777,R5
070254  042714  170000                          BIC     #170000,(R4)
070260  050514                                  BIS     R5,(R4)
070262  005266  000002                          INC     2(SP)                   ; WRD.CNT                       8658
070266  062703  000004                          ADD     #4,R3                   ; *,PAT.CNT                     8652
070272  020327  000013                          CMP     R3,#13                  ; PAT.CNT,*
070276  003713                                  BLE     2$
070300  005202                                  INC     R2                      ; COUNT                         8650
070302  020227  000077                          CMP     R2,#77                  ; COUNT,*
070306  003705                                  BLE     1$
070310  004767  127776                          JSR     PC,GD.BLK.XFER          ;                               8661
070314  012777  000061  125062                  MOV     #61,@ML.REG             ;                               8662
070322  105777  125126                  3$:     TSTB    @ML.REG+50
070326  100375                                  BPL     3$
070330  104402                          4$:     TRAP    2                       ;                               8663
070332  005003                                  CLR     R3                      ; IO.CNT                        8666
070334  010304                          5$:     MOV     R3,R4                   ; IO.CNT,*                      8667
070336  006304                                  ASL     R4
070340  005064  014022                          CLR     IO.BUF(R4)
070344  005203                                  INC     R3                      ; IO.CNT                        8666
070346  020327  000377                          CMP     R3,#377                 ; IO.CNT,*
070352  003770                                  BLE     5$
070354  152777  000040  125062                  BISB    #40,@ML.REG+40          ;                               8667
070362  016704  125444                          MOV     ML.DUT,R4
070366  042704  177770                          BIC     #177770,R4
070372  142777  000007  125044                  BICB    #7,@ML.REG+40
070400  150477  125040                          BISB    R4,@ML.REG+40
070404  004767  127702                          JSR     PC,GD.BLK.XFER          ;                               8670
070410  012777  000071  124766                  MOV     #71,@ML.REG             ;                               8671
070416  105777  125032                  6$:     TSTB    @ML.REG+50
070422  100375                                  BPL     6$
070424  152777  000040  125012                  BISB    #40,@ML.REG+40          ;                               8672
070432  016704  125374                          MOV     ML.DUT,R4
070436  042704  177770                          BIC     #177770,R4
070442  142777  000007  124774                  BICB    #7,@ML.REG+40
070450  150477  124770                          BISB    R4,@ML.REG+40
070454  012766  000004  000006                  MOV     #4,6(SP)                ; *,SIZ.EXP                     8674
070462  005066  000002                          CLR     2(SP)                   ; WRD.CNT                       8675
070466  005001                                  CLR     R1                      ; COUNT                         8677
070470  012703  177777                  7$:     MOV     #-1,R3                  ; *,PAT.CNT                     8679
070474  005005                          8$:     CLR     R5                      ; POS.EXP                       8681
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

070476  012716  000001                          MOV     #1,(SP)                         ; *,PAT.INC                     8682
070502  016604  000002                          MOV     2(SP),R4                        ; WRD.CNT,*                     8683
070506  006304                                  ASL     R4
070510  016466  014022  000004                  MOV     IO.BUF(R4),4(SP)                ; *,TEMP
070516  005002                                  CLR     R2                              ; CNT                           8685
070520  016646  000004                  9$:     MOV     4(SP),-(SP)                     ; TEMP,*                        8688
070524  010546                                  MOV     R5,-(SP)                        ; POS.EXP,*
070526  016646  000012                          MOV     12(SP),-(SP)                    ; SIZ.EXP,*
070532  005046                                  CLR     -(SP)
070534  004767  112752                          JSR     PC,BL$GT1
070540  062706  000010                          ADD     #10,SP
070544  010304                                  MOV     R3,R4                           ; PAT.CNT,*
070546  061604                                  ADD     (SP),R4                         ; PAT.INC,*
070550  020004                                  CMP     R0,R4
070552  001441                                  BEQ     10$
070554  005267  124616                          INC     P.CNT                           ;                               8691
070560  026767  124612  124612                  CMP     P.CNT,LIMIT
070566  003042                                  BGT     11$
070570  104455                                  TRAP    55                              ;                               8693
070572  000131                                  .WORD   131
070574  013012                                  .WORD   ARR.DAT
070576  026302                                  .WORD   DUMPER
070600  012746  010730                          MOV     #WRD.19,-(SP)                   ;                               8694
070604  012746  012226                          MOV     #FNC.6,-(SP)
070610  012746  010650                          MOV     #WRD.12,-(SP)
070614  012746  010630                          MOV     #WRD.10,-(SP)
070620  012746  011270                          MOV     #WRD.50,-(SP)
070624  012746  012414                          MOV     #FNC.18,-(SP)
070630  012746  010322                          MOV     #SIX.FMT,-(SP)
070634  012746  000007                          MOV     #7,-(SP)
070640  010600                                  MOV     SP,R0                           ; SP,*
070642  104414                                  TRAP    14
070644  012766  000001  000030                  MOV     #1,30(SP)                       ; *,DODU.FLG                    8695
070652  062706  000020                          ADD     #20,SP                          ;                               8691
070656  062705  000004                  10$:    ADD     #4,R5                           ; *,POS.EXP                     8698
070662  005216                                  INC     (SP)                            ; PAT.INC                       8699
070664  005202                                  INC     R2                              ; CNT                           8685
070666  020227  000003                          CMP     R2,#3                           ; CNT,*
070672  003712                                  BLE     9$
070674  005266  000002                  11$:    INC     2(SP)                           ; WRD.CNT                       8702
070700  062703  000004                          ADD     #4,R3                           ; *,PAT.CNT                     8679
070704  020327  000013                          CMP     R3,#13                          ; PAT.CNT,*
070710  003671                                  BLE     8$
070712  005201                                  INC     R1                              ; COUNT                         8677
070714  020127  000077                          CMP     R1,#77                          ; COUNT,*
070720  003663                                  BLE     7$
070722  104467                                  TRAP    67                              ;                               8703
070724  006000                                  ROR     R0
070726  103600                                  BLO     4$
070730  026627  000010  000001                  CMP     10(SP),#1                       ; DODU.FLG,*                    8707
070736  001004                                  BNE     12$
070740  016700  125064                          MOV     ML.LUN,R0                       ;                               8710
```

```
19439                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
19440                                   ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
19441
19442 070744  104451                             TRAP    51
19443 070746  104444                             TRAP    44
19444 070750  062706  000012        12$:    ADD     #12,SP                  ;                               8596
19445 070754  000207                             RTS     PC
19446
19447                                   ; Routine Size:  229 words
19448                                   ; Maximum stack depth per invocation:  19 words
19453
19454
19458
19459                                           .SBTTL  T37 TEST CODE SECTION
19463 070756                            T37::
19464 070756  004767  177062          1$:     JSR     PC,$T37                 ;                               8712
19465 070762  104466                             TRAP    66
19466 070764  006000                             ROR     R0
19467 070766  103773                             BLO     1$
19468 070770  000207                             RTS     PC
19469
19470                                   ; Routine Size:  6 words
19471                                   ; Maximum stack depth per invocation:  0 words
19476
19477
19478 ;          8715  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (90)

```
19480 ;ML4AD
19481 ;                 TEST CODE SECTION
19482
19483 ;          8716  !
19484 ;          8717  !
19485 ;          8718  BGNTST;
19486 ;          8719
19487 ;          8720  !++
19488 ;          8721  ! TEST NUMBER:  TST 38
19489 ;          8722  !
19490 ;          8723  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/WRITE PATH
19491 ;          8724  !
19492 ;          8725  ! TEST DESCRIPTION:
19493 ;          8726  !
19494 ;          8727  !       TEST SYNCHRONOUS DATA BUS FOR
19495 ;          8728  !       DATA BIT UNIQUENESS BY:
19496 ;          8729  !
19497 ;          8730  !       1.  LOADING THE FIRST 16 WORDS IN
19498 ;          8731  !           THE IO_BUF WITH A SHIFTING
19499 ;          8732  !           ZERO IN A FIELD OF ONES PATTERN.
19500 ;          8733  !
19501 ;          8734  !       2.  VIA MBUS WRITE FUNCTION WRITE
19502 ;          8735  !           SHIFTING PATTERN THROUGH THE
19503 ;          8736  !           DATA BUS AND INTO THE GOOD
19504 ;          8737  !           BLOCK.
19505 ;          8738  !
19506 ;          8739  !       3.  VIA DAT_DM MODE READ THE
19507 ;          8740  !           GOOD BLOCK AND SAVE ALL GOOD
19508 ;          8741  !           NIBBLE DATA, IN THEIR PROPER
19509 ;          8742  !           SEQUENCE, INTO A STACK
19510 ;          8743  !           STRUCTURE.
19511 ;          8744  !
19512 ;          8745  !       4.  INTERRIGATE STACK STRUCTURE FOR
19513 ;          8746  !           SHIFTED DATA PATTERN.
19514 ;          8747  !
19515 ;          8748  !
19516 ;          8749  ! IMPLICIT INPUTS:
19517 ;          8750  !
19518 ;          8751  !       PD_TEMP
19519 ;          8752  !       A BIT VECTOR OF 16 BITS WHERE
19520 ;          8753  !       THE READ PROM DATA IS STORED
19521 ;          8754  !       AND ACCESSED FROM.
19522 ;          8755  !
19523 ;          8756  !       IO_BUF
19524 ;          8757  !       A VECTOR OF 256 WORDS WHERE
19525 ;          8758  !       DATA FOR MBUS READS AND WRITE
19526 ;          8759  !       FUNCTION ARE FOUND.
19527 ;          8760  !
19528 ;          8761  !       STACK
19529 ;          8762  !       A VECTOR OF 198 BYTE LOCATIONS
19530 ;          8763  !       WHERE GOOD NIBBLE DATA IS STORED
19531 ;          8764  !       WHEN STRIPPING AWAY BAD NIBBLE
19532 ;          8765  !       LOCATIONS OF A BLOCK.
19533 ;          8766  !
19534 ;          8767  !
```

```
 19536 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 19537 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)
 19538 ;
 19539 ;          8768  !--
 19540 ;          8769
 19541 ;          8770  local
 19542 ;          8771      SAV_NIB,                             !STORES THE SHIFTED BIT PATTERN
 19543 ;          8772      DODD_FLG,                            !DROP UNIT FLAG
 19544 ;          8773      NIB_BIT,                             !NIBBLE PATTERN
 19545 ;          8774      TST_PAT,                             !TEST PATTERN
 19546 ;          8775      ALL_ONES_1,                          !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
 19547 ;          8776      ALL_ONES_2,                          !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
 19548 ;          8777      STK_PTR,                             !STACK POINTER
 19549 ;          8778      COUNT;                               !COUNTER
 19550 ;          8779
 19551 ;          8780  CLR_THRESHOLD;                           !CLEAR ERROR PRINT THRESHOLD
 19552 ;          8781  BGNSUB;
 19553 ;          8782  CLR_MBUS;
 19554 ;          8783  DODD_FLG = ZERO;
 19555 ;          8784  TST_PAT = ONE;                           !ONE IN A FIELD OF ZEROES
 19556 ;          8785
 19557 ;          8786  incr CNT from 0 to 15 do                 !WRITE 16 WORDS WITH SHIFTING 0 IN FIELD OF 1'S.
 19558 ;          8787      begin
 19559 ;          8788      IO_BUF [.CNT] = not .TST_PAT;
 19560 ;          8789      TST_PAT = .TST_PAT^ONE;
 19561 ;          8790      end;
 19562 ;          8791
 19563 ;          8792  GD_BLK_XFER ();                          !SET UP A GOOD BLOCK XFERR
 19564 ;          8793  MLCS1 = write;                           !WRITE SHIFTING PATTERN THROUGH SYNC BUS
 19565 ;          8794  TIME_OUT_LOOP;
 19566 ;          8795  STRIPPER (21, 8);                        !CALL ROUTINE TO STRIP OUT BAD NIBBLE DATA FROM ARRAY WORDS
 19567 ;          8796  STK_PTR = -1;                            !RESET THE STACK POINTER
 19568 ;          8797  NIB_BIT = ONE;                           !SHIFTING NIBBLE PAT OF 1 IN FIELD OF 0'S
 19569 ;          8798  ALL_ONES_1 = ZERO;                       !READ NO '17' NIBBLE PATTERN ON FIRST PASS
 19570 ;          8799  ALL_ONES_2 = 3;                          !READ THREE '17' NIBBLE PATTERN ON FIRST PASS
 19571 ;          8800
 19572 ;          8801  incr BY_FOUR_WRDS from 0 to 3 do        !READ 4 GROUPS OF 4 WORDS
 19573 ;          8802      begin
 19574 ;          8803
 19575 ;          8804      incr BY_ONE_WRD from 0 to 3 do       !READ 4 GROUPS OF 1 WORD
 19576 ;          8805          begin
 19577 ;          8806          COUNT = ZERO;                    !CLEAR COUNT
 19578 ;          8807
 19579 ;          8808          until .COUNT eql .ALL_ONES_1 do  !READ X NUMBER OF '17' NIBBLE PAT
 19580 ;          8809              begin
 19581 ;          8810              COUNT = .COUNT + 1;          !INCREMENT COUNT
 19582 ;          8811              STK_PTR = .STK_PTR + 1;      !INCREMENT STACK POINTER
 19583 ;          8812
 19584 ;          8813              if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK WITH '17'
 19585 ;          8814              then
 19586 ;          8815                  begin                    !ERROR AND SET DODU_FLG IF NEQ
 19587 ;          8816                  CMP_THRESHOLD;           !COMPARE ERROR PRINT THRESHOLD
 19588 ;          8817                  ERRDF (90, SYNC, DUMPER);
 19589 ;          8818                  PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
 19590 ;          8819                  PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)

;          8820                 DODU_FLG = ONE;
;          8821                 end;
;          8822
;          8823             end;
;          8824
;          8825         STK_PTR = .STK_PTR + 1;                    !INCREMENT THE STACK POINTER
;          8826         SAV_NIB = ( not .NIB_BIT) and (%o'000017');     !GENERATE THE SHIFTED BIT
;          8827
;          8828         if (.stack [.STK_PTR]) neq (.SAV_NIB)   !COMPARE STACK TO SHIFTED BIT
;          8829         then
;          8830             begin                                  !ERROR AND SET DODU_FLG IF NEQ
;          8831             CMP_THRESHOLD;                         !COMPARE ERROR PRINT THRESHOLD
;          8832             ERRDF (91, SYNC, DUMPER);
;          8833             PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
;          8834             PRINTB (FMT_15, .STK_PTR);
;          8835             PRINTB (FMT_5, .SAV_NIB, .stack [.STK_PTR]);
;          8836             DODU_FLG = ONE;
;          8837             end;
;          8838
;          8839         COUNT = ZEROES;                            !CLEAR COUNT
;          8840
;          8841         until .COUNT eql .ALL_ONES_2 do            !READ X NUMBER OF '17' NIBBLE PAT
;          8842             begin
;          8843             COUNT = .COUNT + 1;                    !INCREMENT COUNT
;          8844             STK_PTR = .STK_PTR + 1;                !INCREMENT STACK POINTER
;          8845
;          8846             if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK POINTER WITH  '17'
;          8847             then
;          8848                 begin                              !ERROR AND SET DODU_FLG IF SET
;          8849                 CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;          8850                 ERRDF (92, SYNC, DUMPER);
;          8851                 PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
;          8852                 PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
;          8853                 DODU_FLG = ONE;
;          8854                 end;
;          8855
;          8856             end;
;          8857
;          8858         NIB_BIT = .NIB_BIT^ONE;                    !SHIFT THE SHIFTED NIBBLE BIT
;          8859         end;
;          8860
;          8861     NIB_BIT = ONE;                                 !RESET THE SHIFTED NIBBLE BIT
;          8862     ALL_ONES_1 = .ALL_ONES_1 + 1;                  !READ ONE MORE '17' PATTERN
;          8863     ALL_ONES_2 = .ALL_ONES_2 - 1;                  !READ ONE LESS '17' PATTERN
;          8864     end;
;          8865
;          8866 ENDSUB;
;          8867
;          8868 if .DODU_FLG IS_SET                                !DROP THIS UNIT IF DODU_FLG SET
;          8869 then
;          8870     begin
;          8871     DODU (.ML_LUN);
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)

;          8872      DOCLN;
;          8873      end;
;          8874
;          8875  ENDTST;

                                        .SBTTL  $T38 TEST CODE SECTION
070772  004167  113614          $T38:   JSR     R1,$SAVE5                       ;                                   8714
070776  162706  000012                  SUB     #12,SP
071002  005067  124370                  CLR     P.CNT                           ;                                   8778
071006  104402                  1$:     TRAP    2                               ;                                   8780
071010  152777  000040  124426          BISB    #40,@ML.REG+40                  ;                                   8781
071016  016705  125010                  MOV     ML.DUT,R5
071022  042705  177770                  BIC     #177770,R5
071026  142777  000007  124410          BICB    #7,@ML.REG+40
071034  150577  124404                  BISB    R5,@ML.REG+40
071040  005001                          CLR     R1                              ; DODU.FLG                          8783
071042  012766  000001  000006          MOV     #1,6(SP)                        ; *,TST.PAT                         8784
071050  005004                          CLR     R4                              ; CNT                               8786
071052  010405                  2$:     MOV     R4,R5                           ; CNT,*                             8788
071054  006305                          ASL     R5
071056  016665  000006  014022          MOV     6(SP),IO.BUF(R5)                ; TST.PAT,*
071064  005165  014022                  COM     IO.BUF(R5)
071070  006366  000006                  ASL     6(SP)                           ; TST.PAT                           8789
071074  005204                          INC     R4                              ; CNT                               8786
071076  020427  000017                  CMP     R4,#17                          ; CNT,*
071102  003763                          BLE     2$
071104  004767  127202                  JSR     PC,GD.BLK.XFER                  ;                                   8792
071110  012777  000061  124266          MOV     #61,@ML.REG                     ;                                   8793
071116  105777  124332          3$:     TSTB    @ML.REG+50
071122  100375                          BPL     3$
071124  012746  000025                  MOV     #25,-(SP)                       ;                                   8795
071130  012746  000010                  MOV     #10,-(SP)
071134  004767  125304                  JSR     PC,STRIPPER
071140  012702  177777                  MOV     #-1,R2                          ; *,STK.PTR                         8796
071144  012766  000001  000004          MOV     #1,4(SP)                        ; *,NIB.BIT                         8797
071152  005066  000010                  CLR     10(SP)                          ; ALL.ONES.1                        8798
071156  012766  000003  000006          MOV     #3,6(SP)                        ; *,ALL.ONES.2                      8799
071164  005004                          CLR     R4                              ; BY.FOUR.WRDS                      8801
071166  005005                  4$:     CLR     R5                              ; BY.ONE.WRD                        8804
071170  005003                  5$:     CLR     R3                              ; COUNT                             8806
071172  020366  000010          6$:     CMP     R3,10(SP)                       ; COUNT,ALL.ONES.1                  8808
071176  001463                          BEQ     7$
071200  005203                          INC     R3                              ; COUNT                             8810
071202  005202                          INC     R2                              ; STK.PTR                           8811
071204  126227  015034  000017          CMPB    STACK(R2),#17                   ; *(STK.PTR),*                      8813
071212  001767                          BEQ     6$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

071214  005267  124156                          INC     P.CNT                   ;                                       8815
071220  026767  124152  124152                  CMP     P.CNT,LIMIT
071226  003047                                  BGT     7$
071230  104455                                  TRAP    55                      ;                                       8817
071232  000132                                  .WORD   132
071234  012750                                  .WORD   SYNC
071236  026302                                  .WORD   DUMPER
071240  012746  010730                          MOV     #WRD.19,-(SP)           ;                                       8818
071244  012746  012216                          MOV     #FNC.5,-(SP)
071250  012746  010650                          MOV     #WRD.12,-(SP)
071254  012746  011676                          MOV     #PHR.4,-(SP)
071260  012746  011140                          MOV     #WRD.39,-(SP)
071264  012746  010766                          MOV     #WRD.23,-(SP)
071270  012746  010322                          MOV     #SIX.FMT,-(SP)
071274  012746  000007                          MOV     #7,-(SP)
071300  010600                                  MOV     SP,R0                   ; SP,*
071302  104414                                  TRAP    14
071304  010216                                  MOV     R2,(SP)                 ; STK.PTR,*                             8819
071306  005046                                  CLR     -(SP)
071310  116216  015034                          MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
071314  012746  177777                          MOV     #-1,-(SP)
071320  012746  006650                          MOV     #FMT.5,-(SP)
071324  012746  000004                          MOV     #4,-(SP)
071330  010600                                  MOV     SP,R0                   ; SP,*
071332  104414                                  TRAP    14
071334  012701  000001                          MOV     #1,R1                   ; *,DODU.FLG                            8820
071340  062706  000030                          ADD     #30,SP                  ;                                       8815
071344  000712                                  BR      6$                      ;                                       8808
071346  005202                          7$:     INC     R2                      ; STK.PTR                               8825
071350  012766  000017  000014                  MOV     #17,14(SP)              ; *,SAV.NIB                             8826
071356  046666  000004  000014                  BIC     4(SP),14(SP)            ; NIB.BIT,SAV.NIB
071364  005000                                  CLR     R0                      ;                                       8828
071366  156200  015034                          BISB    STACK(R2),R0            ; *(STK.PTR),*
071372  020066  000014                          CMP     R0,14(SP)               ; *,SAV.NIB
071376  001462                                  BEQ     8$
071400  005267  123772                          INC     P.CNT                   ;                                       8830
071404  026767  123766  123766                  CMP     P.CNT,LIMIT
071412  003153                                  BGT     11$
071414  104455                                  TRAP    55                      ;                                       8832
071416  000133                                  .WORD   133
071420  012750                                  .WORD   SYNC
071422  026302                                  .WORD   DUMPER
071424  012746  010730                          MOV     #WRD.19,-(SP)           ;                                       8833
071430  012746  012216                          MOV     #FNC.5,-(SP)
071434  012746  010650                          MOV     #WRD.12,-(SP)
071440  012746  011676                          MOV     #PHR.4,-(SP)
071444  012746  011140                          MOV     #WRD.39,-(SP)
071450  012746  010766                          MOV     #WRD.23,-(SP)
071454  012746  010322                          MOV     #SIX.FMT,-(SP)
071460  012746  000007                          MOV     #7,-(SP)
071464  010600                                  MOV     SP,R0                   ; SP,*
071466  104414                                  TRAP    14
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

071470  010216                                  MOV     R2,(SP)                 ; STK.PTR,*                                 8834
071472  012746  007370                          MOV     #FMT.15,-(SP)
071476  012746  000002                          MOV     #2,-(SP)
071502  010600                                  MOV     SP,R0                   ; SP,*
071504  104414                                  TRAP    14
071506  005016                                  CLR     (SP)                    ;                                           8835
071510  116216  015034                          MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
071514  016646  000040                          MOV     40(SP),-(SP)            ; SAV.NIB,*
071520  012746  006650                          MOV     #FMT.5,-(SP)
071524  012746  000003                          MOV     #3,-(SP)
071530  010600                                  MOV     SP,R0                   ; SP,*
071532  104414                                  TRAP    14
071534  012701  000001                          MOV     #1,R1                   ; *,DODU.FLG                                8836
071540  062706  000032                          ADD     #32,SP                  ;                                           8830
071544  005003                          8$:     CLR     R3                      ; COUNT                                     8839
071546  020366  000006                  9$:     CMP     R3,6(SP)                ; COUNT,ALL.ONES.2                          8841
071552  001463                                  BEQ     10$
071554  005203                                  INC     R3                      ; COUNT                                     8843
071556  005202                                  INC     R2                      ; STK.PTR                                   8844
071560  126227  015034  000017                  CMPB    STACK(R2),#17           ; *(STK.PTR),*                              8846
071566  001767                                  BEQ     9$
071570  005267  123602                          INC     P.CNT                   ;                                           8848
071574  026767  123576  123576                  CMP     P.CNT,LIMIT
071602  003047                                  BGT     10$
071604  104455                                  TRAP    55                      ;                                           8850
071606  000134                                  .WORD   134
071610  012750                                  .WORD   SYNC
071612  026302                                  .WORD   DUMPER
071614  012746  010730                          MOV     #WRD.19,-(SP)           ;                                           8851
071620  012746  012216                          MOV     #FNC.5,-(SP)
071624  012746  010650                          MOV     #WRD.12,-(SP)
071630  012746  011676                          MOV     #PHR.4,-(SP)
071634  012746  011140                          MOV     #WRD.39,-(SP)
071640  012746  010766                          MOV     #WRD.23,-(SP)
071644  012746  010322                          MOV     #SIX.FMT,-(SP)
071650  012746  000007                          MOV     #7,-(SP)
071654  010600                                  MOV     SP,R0                   ; SP,*
071656  104414                                  TRAP    14
071660  010216                                  MOV     R2,(SP)                 ; STK.PTR,*                                 8852
071662  005046                                  CLR     -(SP)
071664  116216  015034                          MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
071670  012746  177777                          MOV     #-1,-(SP)
071674  012746  006650                          MOV     #FMT.5,-(SP)
071700  012746  000004                          MOV     #4,-(SP)
071704  010600                                  MOV     SP,R0                   ; SP,*
071706  104414                                  TRAP    14
071710  012701  000001                          MOV     #1,R1                   ; *,DODU.FLG                                8853
071714  062706  000030                          ADD     #30,SP                  ;                                           8848
071720  000712                                  BR      9$                      ;                                           8841
071722  006366  000004                  10$:    ASL     4(SP)                   ; NIB.BIT                                   8858
071726  005205                                  INC     R5                      ; BY.ONE.WRD                                8804
071730  020527  000003                          CMP     R5,#3                   ; BY.ONE.WRD,*
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

                                                BGT     11$
071734  003002                                  JMP     5$
071736  000167  177226                          MOV     #1,4(SP)                        ; *,NIB.BIT                     8861
071742  012766  000001  000004  11$:            INC     10(SP)                          ; ALL.ONES.1                    8862
071750  005266  000010                          DEC     6(SP)                           ; ALL.ONES.2                    8863
071754  005366  000006                          INC     R4                              ; BY.FOUR.WRDS                  8801
071760  005204                                  CMP     R4,#3                           ; BY.FOUR.WRDS,*
071762  020427  000003                          BGT     12$
071766  003002                                  JMP     4$
071770  000167  177172                          CMP     (SP)+,(SP)+                     ;                               8780
071774  022626                  12$:            TRAP    67                              ;                               8864
071776  104467                                  ROR     R0
072000  006000                                  BHIS    13$
072002  103002                                  JMP     1$
072004  000167  176776                          DEC     R1                              ; DODU.FLG                      8868
072010  005301                  13$:            BNE     14$
072012  001004                                  MOV     ML.LUN,R0                       ;                               8871
072014  016700  124010                          TRAP    51
072020  104451                                  TRAP    44
072022  104444                                  ADD     #12,SP                          ;                               8714
072024  062706  000012          14$:            RTS     PC
072030  000207

                                        ; Routine Size:  272 words
                                        ; Maximum stack depth per invocation:  26 words



                                                .SBTTL  T38 TEST CODE SECTION
072032                          T38::
072032  004767  176734          1$:             JSR     PC,$T38                         ;                               8873
072036  104466                                  TRAP    66
072040  006000                                  ROR     R0
072042  103773                                  BLO     1$
072044  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
;          8876  !<BLF/PAGE>
```

```
19872 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
19873 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (91)
19874
19875 ;          8877  !
19876 ;          8878  BGNTST;
19877 ;          8879
19878 ;          8880  !++
19879 ;          8881  ! TEST NUMBER:  TST 39
19880 ;          8882  !
19881 ;          8883  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/READ PATH
19882 ;          8884  !
19883 ;          8885  ! TEST DESCRIPTION:
19884 ;          8886  !       TEST SYNCHRONOUS DATA BUS READ
19885 ;          8887  !       PATH FOR DATA BIT UNIQUENESS BY:
19886 ;          8888  !
19887 ;          8889  !       1.  LOADING THE FIRST 16 WORDS IN THE IO_BUF WITH A SHIFTING
19888 ;          8890  !           ZERO IN A FIELD OF ONES PATTERN.
19889 ;          8891  !
19890 ;          8892  !       2.  VIA MBUS WRITE FUNCTION WRITE SHIFTING PATTERN INTO THE GOOD BLOCK.
19891 ;          8893  !
19892 ;          8894  !       3.  CLEAR THE IO_BUF.
19893 ;          8895  !
19894 ;          8896  !       4.  VIA MBUS READ FUNCTION READ THE SHIFTING PATTERN THROUGH THE
19895 ;          8897  !           READ PATH.
19896 ;          8898  !
19897 ;          8899  !       5.  INTERIGATE THE IO_BUF FOR THE SHIFTING PATTERN.
19898 ;          8900  !
19899 ;          8901  ! IMPLICIT INPUTS:
19900 ;          8902  !       IO_BUF
19901 ;          8903  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION ARD FOUND.
19902 ;          8904  !--
19903 ;          8905
19904 ;          8906  local
19905 ;          8907      DODU_FLG,                              !DROP UNIT FLAG
19906 ;          8908      TST_PAT;                               !TEST PATTERN
19907 ;          8909
19908 ;          8910  CLR_MBUS;
19909 ;          8911  DODU_FLG = ZERO;
19910 ;          8912  TST_PAT = ONE;                             !ONE IN A FIELD OF ZEROES
19911 ;          8913
19912 ;          8914  incr CNT from 0 to 15 do                  !WRITE 16 WORDS WITH SHIFTED 0 IN A FIELD OF 1'S
19913 ;          8915      begin
19914 ;          8916      IO_BUF [.CNT] = not .TST_PAT;
19915 ;          8917      TST_PAT = .TST_PAT^ONE;
19916 ;          8918      end;
19917 ;          8919
19918 ;          8920  GD_BLK_XFER ();                           !SET UP A GOOD BLOCK XFERR
19919 ;          8921  ML11S1 = write;                           !WRITE SHIFTING PATTERN
19920 ;          8922  TIME_OUT_LOOP;
19921 ;          8923  BGNSUB;
19922 ;          8924
19923 ;          8925  incr CNT from 0 to 15 do                  !CLEAR OUT THE IO_BUF
19924 ;          8926      IO_BUF [.CNT] = ZEROES;
19925 ;          8927
19926 ;          8928  CLR_MBUS;
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (91)

;          8929  GD_BLK_XFER ();                                        !SET UP A GOOD BLOCK XFERR
;          8930  MLCS1 = read;                                          !READ SHIFTING PATTERN THROUGH SYNC BUS
;          8931  TIME_OUT_LOOP;
;          8932  TST_PAT = ONE;                                         !SHIFTING PATTERN
;          8933
;          8934  incr CNT from 0 to 15 do                               !READ IO_BUF FOR SHIFTING 0 IN FIELD OF 1'S
;          8935      begin
;          8936
;          8937      if .IO_BUF [.CNT] neq ( not .TST_PAT)              !COMPARE IO_BUF TO SHIFTED PAT
;          8938      then
;          8939          begin                                          !ERROR AND SET DODU_FLG IF NEQ
;          8940          ERRDF (93, SYNC, DUMPER);
;          8941          PRINTB (FIV_FMT, WRD_23, FNC_6, WRD_19, WRD_39, PHR_4);
;          8942          PRINTB (FMT_2, ( not .TST_PAT), .IO_BUF [.CNT], ( not .TST_PAT xor .IO_BUF [.CNT]));
;          8943          DODU_FLG = ONE;
;          8944          end;
;          8945
;          8946      TST_PAT = .TST_PAT^ONE;                            !SHIFT THE PATTERN AND REPEAT
;          8947      end;
;          8948
;          8949  ENDSUB;
;          8950
;          8951  if .DODU_FLG IS_SET                                    !DROP THIS UNIT IF DODU_FLG IS_SET
;          8952  then
;          8953      begin
;          8954      DODU (.ML_LUN);
;          8955      DOCLN;
;          8956      end;
;          8957
;          8958  ENDTST;

                                        .SBTTL  $T39 TEST CODE SECTION
072046  004167  112540          $T39:   JSR     R1,$SAVE5                       ;                                  8875
072052  152777  000040  123364          BISB    #40,@ML.REG+40                  ;                                  8908
072060  016705  123746                  MOV     ML.DUT,R5
072064  042705  177770                  BIC     #177770,R5
072070  142777  000007  123346          BICB    #7,@ML.REG+40
072076  150577  123342                  BISB    R5,@ML.REG+40
072102  005005                          CLR     R5                              ; DODU.FLG                         8911
072104  012704  000001                  MOV     #1,R4                           ; *,TST.PAT                        8912
072110  005000                          CLR     R0                              ; CNT                              8914
072112  010001                  1$:     MOV     R0,R1                           ; CNT,*                            8916
072114  006301                          ASL     R1
072116  010461  014022                  MOV     R4,IO.BUF(R1)                   ; TST.PAT,*
072122  005161  014022                  COM     IO.BUF(R1)
072126  006304                          ASL     R4                              ; TST.PAT                          8917
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

072130  005200                                  INC     R0                      ; CNT                                   8914
072132  020027  000017                          CMP     R0,#17                  ; CNT,*
072136  003765                                  BLE     1$
072140  004767  126146                          JSR     PC,GD.BLK.XFER          ;                                       8920
072144  012777  000061  123232                  MOV     #61,@ML.REG             ;                                       8921
072152  105777  123276                  2$:     TSTB    @ML.REG+50
072156  100375                                  BPL     2$
072160  104402                          3$:     TRAP    2                       ;                                       8922
072162  005000                                  CLR     R0                      ; CNT                                   8925
072164  010001                          4$:     MOV     R0,R1                   ; CNT,*                                 8926
072166  006301                                  ASL     R1
072170  005061  014022                          CLR     IO.BUF(R1)
072174  005200                                  INC     R0                      ; CNT                                   8925
072176  020027  000017                          CMP     R0,#17                  ; CNT,*
072202  003770                                  BLE     4$
072204  152777  000040  123232                  BISB    #40,@ML.REG+40          ;                                       8926
072212  016703  123614                          MOV     ML.DUT,R3
072216  042703  177770                          BIC     #177770,R3
072222  142777  000007  123214                  BICB    #7,@ML.REG+40
072230  150377  123210                          BISB    R3,@ML.REG+40
072234  004767  126052                          JSR     PC,GD.BLK.XFER          ;                                       8929
072240  012777  000071  123136                  MOV     #71,@ML.REG             ;                                       8930
072246  105777  123202                  5$:     TSTB    @ML.REG+50
072252  100375                                  BPL     5$
072254  012704  000001                          MOV     #1,R4                   ; *,TST.PAT                             8932
072260  005002                                  CLR     R2                      ; CNT                                   8934
072262  010201                          6$:     MOV     R2,R1                   ; CNT,*                                 8937
072264  006301                                  ASL     R1
072266  012703  014022                          MOV     #IO.BUF,R3
072272  060103                                  ADD     R1,R3
072274  010401                                  MOV     R4,R1                   ; TST.PAT,*
072276  005101                                  COM     R1
072300  021301                                  CMP     (R3),R1
072302  001447                                  BEQ     7$
072304  104455                                  TRAP    55                      ;                                       8940
072306  000135                                  .WORD   135
072310  012750                                  .WORD   SYNC
072312  026302                                  .WORD   DUMPER
072314  012746  011676                          MOV     #PHR.4,-(SP)            ;                                       8941
072320  012746  011140                          MOV     #WRD.39,-(SP)
072324  012746  010730                          MOV     #WRD.19,-(SP)
072330  012746  012226                          MOV     #FNC.6,-(SP)
072334  012746  010766                          MOV     #WRD.23,-(SP)
072340  012746  010304                          MOV     #FIV.FMT,-(SP)
072344  012746  000006                          MOV     #6,-(SP)
072350  010600                                  MOV     SP,R0                   ; SP,*
072352  104414                                  TRAP    14
072354  011316                                  MOV     (R3),(SP)               ;                                       8942
072356  010146                                  MOV     R1,-(SP)
072360  046616  000002                          BIC     2(SP),(SP)
072364  040166  000002                          BIC     R1,2(SP)
072370  052616                                  BIS     (SP)+,(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

072372  011346                                  MOV     (R3),-(SP)
072374  010146                                  MOV     R1,-(SP)
072376  012746  006506                          MOV     #FMT.2,-(SP)
072402  012746  000004                          MOV     #4,-(SP)
072406  010600                                  MOV     SP,R0                           ; SP,*
072410  104414                                  TRAP    14
072412  012705  000001                          MOV     #1,R5                           ; *,DODU.FLG                    8943
072416  062706  000026                          ADD     #26,SP                          ;                               8939
072422  006304                          7$:     ASL     R4                              ; TST.PAT                       8946
072424  005202                                  INC     R2                              ; CNT                           8934
072426  020227  000017                          CMP     R2,#17                          ; CNT,*
072432  003713                                  BLE     6$
072434  104467                                  TRAP    67                              ;                               8947
072436  006000                                  ROR     R0
072440  103647                                  BLO     3$
072442  005305                                  DEC     R5                              ; DODU.FLG                      8951
072444  001004                                  BNE     8$
072446  016700  123356                          MOV     ML.LUN,R0                       ;                               8954
072452  104451                                  TRAP    51
072454  104444                                  TRAP    44
072456  000207                          8$:     RTS     PC                              ;                               8875

                                        ; Routine Size:  133 words
                                        ; Maximum stack depth per invocation:  17 words



                                                .SBTTL  T39 TEST CODE SECTION
072460                                  T39::
072460  004767  177362                  1$:     JSR     PC,$T39                         ;                               8956
072464  104466                                  TRAP    66
072466  006000                                  ROR     R0
072470  103773                                  BLO     1$
072472  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
;          8959  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)

;                !
;                !
;                BGNTST;
;
;                !++
;                ! TEST NUMBER:  TST 40
;                !
;                ! TEST NAME:    ARRAY ADDRESS MUX TEST
;                !
;                ! TEST DESCRIPTION:
;                !
;                !       TEST FOR UNIQUE MOS RAM ROW
;                !       AND COLUMN ADDRESSING BY:
;                !
;                !       1.  FIRST FINDING A ERROR FREE
;                !           16K OR 64K CHUNK OF MEMORY.
;                !           THIS REPRESENTS ONE ROW OF
;                !           EITHER 16K OR 64K MOS RAMS.
;                !
;                !       2.  WRITE A BACKGROUND OF ALL
;                !           ONES INTO THE GOOD CHUNK
;                !
;                !       3.  WRITE ZEROES INTO THE FIRST
;                !           BLOCK OF THE GOOD CHUNK.
;                !
;                !       4.  READ REMAINING BLOCKS IN
;                !           GOOD CHUNK FOR ONES.
;                !
;                !
;                ! IMPLICIT INPUTS:
;                !
;                !       IO_BUF
;                !
;                !       A VECTOR OF 256 WORDS
;                !       WHERE DATA FOR MBUS
;                !       READ AND WRITE TRANSFERS
;                !       CAN BE FOUND.
;                !--
;
;                local
;                    DSA_ADRS,                                  !DSA ADRS COUNTER
;                    FND_GD_CHK;                                !FOUND GOOD 16K/64K CHUNK FLAG
;
;                IO_BUF = ONES;                                 !LOAD FIRST IO_BUF WORD WITH ONES
;                DSA_ADRS = -.RAS_INC;                          !REST DSA COUNT
;                FND_GD_CHK = ZERO;                             !CLEAR FLAG
;
;                do                                             !DO UNTIL FOUND GOOD CHUNK OR LBT
;                    begin
;                    CLR_MBUS;
;                    BAI = ONE;                                 !SET ON FIRST IO BUF WORD
;                    ECC_DIS = ONE;                             !DISABLE ECC
```

```
20152 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20153 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)
20154 ;
20155 ;         9012        DSA_ADRS = .DSA_ADRS + .RAS_INC;    !INCREMENT DSA ADRS COUNTER
20156 ;         9013        MLWC = .W_C_SIZE;                   !16K OR 64K WORDS
20157 ;         9014        MLBA = IO_BUF;                      !LOAD UBUS ADRS
20158 ;         9015        MLDA = .DSA_ADRS;                   !LOAD DSA ADRS
20159 ;         9016        ML_FUNC = write;                    !DO A WRITE FUNCTION
20160 ;         9017        TIME_OUT_LOOP;
20161 ;         9018
20162 ;         9019        if .SC IS_NOT_SET                   !DID XFERR CAUSE AN SC
20163 ;         9020        then
20164 ;         9021            begin                           !XFERR WAS OK
20165 ;         9022            MLWC = .W_C_SIZE;               !LOAD WORD COUNT
20166 ;         9023            MLBA = IO_BUF;                  !LOAD UBUS ADRS
20167 ;         9024            MLDA = .DSA_ADRS;               !LOAD DSA ADRS
20168 ;         9025            ML_FUNC = WRT_CHK;              !DO A WRITE CHECK FUNCTION
20169 ;         9026            TIME_OUT_LOOP;
20170 ;         9027
20171 ;         9028            if .SC IS_NOT_SET               !IS THIS CHUNK GOOD
20172 ;         9029            then
20173 ;         9030                FND_GD_CHK = ONE;           !YES SET FLG
20174 ;         9031
20175 ;         9032            end
20176 ;         9033
20177 ;         9034        end
20178 ;         9035    !
20179 ;         9036    !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
20180 ;         9037    !
20181 ;         9038    until (.FND_GD_CHK IS_SET ) or (.DSA_ADRS eqlU .LST_ARR + .ARR_INC);
20182 ;         9039
20183 ;         9040                                            !REPEAT UNTIL FOUND GOOD CHUNCK OR AT LBT
20184 ;         9041
20185 ;         9042    !
20186 ;         9043    !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
20187 ;         9044    !
20188 ;         9045    if .DSA_ADRS eqlU .LST_ARR + .ARR_INC
20189 ;         9046    then
20190 ;         9047        begin
20191 ;         9048        ERRDF (111, INTER, DUMPER);
20192 ;         9049        PRINTB (FIV_FMT, FNC_13, FNC_17, WRD_50, WRD_60, WRD_56);
20193 ;         9050        PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
20194 ;         9051        end
20195 ;         9052    else                                    !A GOOD CHUNCK WAS FOUND CONTINUE TEST
20196 ;         9053        begin
20197 ;         9054        CLR_MBUS;
20198 ;         9055        BAI = ONE;
20199 ;         9056        ECC_DIS = ONE;                      !DISABLE ECC
20200 ;         9057        IO_BUF = ZEROES;                    !FIRST BLOCK IN CHUNCK GETS ZEROES
20201 ;         9058        MLDA = .DSA_ADRS;                   !LOAD DSA
20202 ;         9059        MLWC = not 255;                     !LOAD WORD COUNT
20203 ;         9060        MLBA = IO_BUF;                      !LOAD UBUS ADRS
20204 ;         9061        ML_FUNC = write;                    !DO A WRITE FUNCTION
20205 ;         9062        TIME_OUT_LOOP;
20206 ;         9063        CLR_MBUS;
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)

;          9064      BAI = ONE;
;          9065      IO_BUF = ONES;                                     !READ REMAINING BLOCKS FOR ONES
;          9066      ECC_DIS = ONE;
;          9067      MLDA = .DSA_ADRS + 1;                              !LOAD DSA WITH NEXT DSA INCREMENT
;          9068      MLBA = IO_BUF;                                     !LOAD  UBUS ADRS
;          9069      MLWC = .W_C_SIZE + 256;                            !LOAD WORD COUNT WITH LESS ONE BLOCK
;          9070      ML_FUNC = WRT_CHK;                                 !DO A WRITE CHECK FUNCTION
;          9071      TIME_OUT_LOOP;
;          9072
;          9073      if .WCE IS_SET                                     !WERE ANY BITS DISTURBED
;          9074      then
;          9075          begin                                          !ERROR IF WRITE CHECK FOUND BAD DATA
;          9076          ERRDF (112, ASYNC, DUMPER);
;          9077          PRINTB (FOR_FMT, FNC_17, WRD_50, WRD_60, WRD_14);
;          9078          PRINTB (FMT_9, (.MLDA - 1));
;          9079          DODU (.ML_LUN);
;          9080          DOCLN;
;          9081          end;
;          9082
;          9083      end;
;          9084
;          9085  ENDTST;

                                        .SBTTL  $T40 TEST CODE SECTION
072474  004167  112040          $T40:   JSR     R1,$SAVE2                   ;                                  8958
072500  012767  177777  121314          MOV     #-1,IO.BUF                  ;                                  9003
072506  016702  122634                  MOV     RAS.INC,R2                  ; *,DSA.ADRS                       9004
072512  005402                          NEG     R2                          ; DSA.ADRS
072514  005000                          CLR     R0                          ; FND.GD.CHK                       9005
072516  152777  000040  122720  1$:     BISB    #40,@ML.REG+40              ;                                  9008
072524  016701  123302                  MOV     ML.DUT,R1
072530  042701  177770                  BIC     #177770,R1
072534  142777  000007  122702          BICB    #7,@ML.REG+40
072542  150177  122676                  BISB    R1,@ML.REG+40
072546  152777  000010  122670          BISB    #10,@ML.REG+40              ;                                  9010
072554  152777  000002  122742          BISB    #2,@ML.REG+120              ;                                  9011
072562  066702  122560                  ADD     RAS.INC,R2                  ; *,DSA.ADRS                       9012
072566  016777  122552  122620          MOV     W.C.SIZE,@ML.REG+10         ;                                  9013
072574  012777  014022  122622          MOV     #IO.BUF,@ML.REG+20          ;                                  9014
072602  010277  122626                  MOV     R2,@ML.REG+30               ; DSA.ADRS,*                       9015
072606  142777  000077  122570          BICB    #77,@ML.REG                 ;                                  9016
072614  152777  000061  122562          BISB    #61,@ML.REG
072622  105777  122626          2$:     TSTB    @ML.REG+50
072626  100375                          BPL     2$
072630  032777  100000  122546          BIT     #100000,@ML.REG             ;                                  9019
072636  001027                          BNE     4$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

072640  016777  122500  122546                MOV     W.C.SIZE,@ML.REG+10             ;                                       9022
072646  012777  014022  122550                MOV     #IO.BUF,@ML.REG+20              ;                                       9023
072654  010277  122554                        MOV     R2,@ML.REG+30                   ; DSA.ADRS,*                            9024
072660  142777  000077  122516                BICB    #77,@ML.REG                     ;                                       9025
072666  152777  000051  122510                BISB    #51,@ML.REG
072674  105777  122554                3$:     TSTB    @ML.REG+50
072700  100375                                BPL     3$
072702  032777  100000  122474                BIT     #100000,@ML.REG                 ;                                       9028
072710  001002                                BNE     4$
072712  012700  000001                        MOV     #1,R0                           ; *,FND.GD.CHK                          9030
072716  020027  000001                4$:     CMP     R0,#1                           ; FND.GD.CHK,*                          9038
072722  001406                                BEQ     5$
072724  016701  121070                        MOV     LST.ARR,R1
072730  066701  121050                        ADD     ARR.INC,R1
072734  020201                                CMP     R2,R1                           ; DSA.ADRS,*
072736  001267                                BNE     1$
072740  016701  121054                5$:     MOV     LST.ARR,R1                      ;                                       9045
072744  066701  121034                        ADD     ARR.INC,R1
072750  020201                                CMP     R2,R1                           ; DSA.ADRS,*
072752  001043                                BNE     6$
072754  104455                                TRAP    55                              ;                                       9048
072756  000157                                .WORD   157
072760  013114                                .WORD   INTER
072762  026302                                .WORD   DUMPER
072764  012746  011344                        MOV     #WRD.56,-(SP)                   ;                                       9049
072770  012746  011400                        MOV     #WRD.60,-(SP)
072774  012746  011270                        MOV     #WRD.50,-(SP)
073000  012746  012404                        MOV     #FNC.17,-(SP)
073004  012746  012334                        MOV     #FNC.13,-(SP)
073010  012746  010304                        MOV     #FIV.FMT,-(SP)
073014  012746  000006                        MOV     #6,-(SP)
073020  010600                                MOV     SP,R0                           ; SP,*
073022  104414                                TRAP    14
073024  012716  012360                        MOV     #FNC.15,(SP)                    ;                                       9050
073030  012746  012006                        MOV     #PHR.10,-(SP)
073034  012746  010664                        MOV     #WRD.14,-(SP)
073040  012746  010256                        MOV     #THR.FMT,-(SP)
073044  012746  000004                        MOV     #4,-(SP)
073050  010600                                MOV     SP,R0                           ; SP,*
073052  104414                                TRAP    14
073054  062706  000026                        ADD     #26,SP                          ;                                       9047
073060  000207                                RTS     PC                              ;                                       9045
073062  152777  000040  122354        6$:     BISB    #40,@ML.REG+40                  ;                                       9053
073070  016701  122736                        MOV     ML.DUT,R1
073074  042701  177770                        BIC     #177770,R1
073100  142777  000007  122336                BICB    #7,@ML.REG+40
073106  150177  122332                        BISB    R1,@ML.REG+40
073112  152777  000010  122324                BISB    #10,@ML.REG+40                  ;                                       9055
073120  152777  000002  122376                BISB    #2,@ML.REG+120                  ;                                       9056
073126  005067  120670                        CLR     IO.BUF                          ;                                       9057
073132  010277  122276                        MOV     R2,@ML.REG+30                   ; DSA.ADRS,*                            9058
073136  012777  177400  122250                MOV     #-400,@ML.REG+10                ;                                       9059
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

073144  012777  014022  122252          MOV     #IO.BUF,@ML.REG+20          ;                                       9060
073152  142777  000077  122224          BICB    #77,@ML.REG                 ;                                       9061
073160  152777  000061  122216          BISB    #61,@ML.REG
073166  105777  122262          7$:     TSTB    @ML.REG+50
073172  100375                          BPL     7$
073174  152777  000040  122242          BISB    #40,@ML.REG+40              ;                                       9062
073202  016701  122624                  MOV     ML.DUT,R1
073206  042701  177770                  BIC     #177770,R1
073212  142777  000007  122224          BICB    #7,@ML.REG+40
073220  150177  122220                  BISB    R1,@ML.REG+40
073224  152777  000010  122212          BISB    #10,@ML.REG+40              ;                                       9064
073232  012767  177777  120562          MOV     #-1,IO.BUF                  ;                                       9065
073240  152777  000002  122256          BISB    #2,@ML.REG+120              ;                                       9066
073246  010201                          MOV     R2,R1                       ; DSA.ADRS,*                            9067
073250  005201                          INC     R1
073252  010177  122156                  MOV     R1,@ML.REG+30
073256  012777  014022  122140          MOV     #IO.BUF,@ML.REG+20          ;                                       9068
073264  016702  122054                  MOV     W.C.SIZE,R2                 ;                                       9069
073270  062702  000400                  ADD     #400,R2
073274  010277  122114                  MOV     R2,@ML.REG+10
073300  142777  000077  122076          BICB    #77,@ML.REG                 ;                                       9070
073306  152777  000051  122070          BISB    #51,@ML.REG
073314  105777  122134          8$:     TSTB    @ML.REG+50
073320  100375                          BPL     8$
073322  032777  040000  122114          BIT     #40000,@ML.REG+40           ;                                       9073
073330  001441                          BEQ     9$
073332  104455                          TRAP    55                          ;                                       9076
073334  000160                          .WORD   160
073336  012706                          .WORD   ASYNC
073340  026302                          .WORD   DUMPER
073342  012746  010664                  MOV     #WRD.14,-(SP)               ;                                       9077
073346  012746  011400                  MOV     #WRD.60,-(SP)
073352  012746  011270                  MOV     #WRD.50,-(SP)
073356  012746  012404                  MOV     #FNC.17,-(SP)
073362  012746  010270                  MOV     #FC[illegible].FMT,-(SP)
073366  012746  000005                  MOV     #[illegible]SP)
073372  010600                          MOV     S[illegible]                ; SP,*
073374  104414                          TRAP    14
073376  017716  122032                  MOV     @ML.REG+30,(SP)             ;                                       9078
073402  005316                          DEC     (SP)
073404  012746  007064                  MOV     #FMT.9,-(SP)
073410  012746  000002                  MOV     #2,-(SP)
073414  010600                          MOV     SP,R0                       ; SP,*
073416  104414                          TRAP    14
073420  016700  122404                  MOV     ML.LUN,R0                   ;                                       9079
073424  104451                          TRAP    51
073426  104444                          TRAP    44
073430  062706  000020                  ADD     #20,SP                      ;                                       9075
073434  000207                  9$:     RTS     PC                          ;                                       8958

                                        ; Routine Size:  241 words
                                        ; Maximum stack depth per invocation:  14 words
```

```
                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
                                .SBTTL  T40 TEST CODE SECTION
                                T40::
                                1$:     JSR     PC,$T40                 ;                               9083
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words

;       9086  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (93)

```
20410 ;ML4AD
20411 ;                 TEST CODE SECTION
20412 ;
20413 ;          9087   !
20414 ;          9088   BGNTST;
20415 ;          9089
20416 ;          9090   !++
20417 ;          9091   ! TEST NUMBER:  TST 41
20418 ;          9092   !
20419 ;          9093   ! TEST NAME:    NIBBLE OFFSET TEST
20420 ;          9094   !
20421 ;          9095   ! TEST DESCRIPTION:
20422 ;          9096   !       TEST NIBBLE OFFSET COUNTERS TO OFFSET GOOD NIBBLE DATA A MAX
20423 ;          9097   !       OF 14 WORDS ON DETECTION OF ALL BAD NIBBLES BY:
20424 ;          9098   !
20425 ;          9099   !       1.  LOADING FIRST 2 1/4 WORDS OF THE IO_BUF WITH ZEROES AND THE
20426 ;          9100   !           REMAINING OF BUFFER WITH ONES.
20427 ;          9101   !
20428 ;          9102   !       2.  VIA DAT_DM MODE WRITE THE GOOD BLOCK WITH BACKGROUND
20429 ;          9103   !           ON ONES.
20430 ;          9104   !
20431 ;          9105   !       3.  VIA PROM R/W MODE FORCE ALL ARRAY NIBBLES BAD.
20432 ;          9106   !
20433 ;          9107   !       4.  VIA A MBUS WRITE FUNCTION LOAD IO_BUF INTO THE GOOD BLOCK.
20434 ;          9108   !
20435 ;          9109   !       5.  VIA DAT_DM MODE READ FIRST 15 ARRAY WORDS FOR ZEROES AND THE
20436 ;          9110   !           REMAINING WORDS FOR ONES.
20437 ;          9111   !
20438 ;          9112   ! IMPLICIT INPUTS:
20439 ;          9113   !       PD_TEMP
20440 ;          9114   !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
20441 ;          9115   !       ACCESSED FROM.
20442 ;          9116   !
20443 ;          9117   !       IO_BUF
20444 ;          9118   !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
20445 ;          9119   !       FUNCTIONS ARE FOUND.
20446 ;          9120   !--
20447 ;          9121
20448 ;          9122   local
20449 ;          9123       DODU_FLG,                          !DROP UNIT FLAG
20450 ;          9124       TST_PAT,                           !TEST PATTERN
20451 ;          9125       START,                             !STARTING WORD
20452 ;          9126       FINISH,                            !ENDING WORD
20453 ;          9127       ERR_FLG;                           !ERROR FLAG
20454 ;          9128
20455 ;          9129   CLR_THRESHOLD;                         !CLEAR ERROR PRINT THRESHOLD
20456 ;          9130   BGNSUB;
20457 ;          9131   CLR_MBUS;
20458 ;          9132   DODO_FLG = ZERO;
20459 ;          9133
20460 ;          9134   incr WD_CNT from 0 to 255 do           !LOAD IO_BUF WITH ONES
20461 ;          9135       IO_BUF [.WD_CNT] = ONES;
20462 ;          9136
20463 ;          9137   IO_BUF [0] = ZEROES;                   !LOAD FIRST 2 1/4 WORDS WITH ZEROES
20464 ;          9138   IO_BUF [1] = ZEROES;
```

```
20466 :ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20467 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (93)
20468
20469 ;          9139  IO_BUF [2] = %o'177760';
20470 ;          9140  MLD1 = ONES;                             !LOAD DATA DIAG REGISTERS WITH ONES
20471 ;          9141  MLD2 = ONES;
20472 ;          9142  MLE2 = ONES;
20473 ;          9143  DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE XFERR
20474 ;          9144  MLCS1 = write;                           !DO A WRITE XFERR
20475 ;          9145
20476 ;          9146  incr WD_CNT from 0 to 127 do            !LOAD BLOCK WITH BG PAT
20477 ;          9147      begin
20478 ;          9148      DELAY (ONE_US);
20479 ;          9149      DAT_CLK = ONE;
20480 ;          9150      end;
20481 ;          9151
20482 ;          9152  CLR_MBUS;
20483 ;          9153  WRT_PD (ONES, 19);                       !FORCE ALL NIBBLES BAD
20484 ;          9154  PROM_RW = ONE;                           !SET PROM READ WRITE
20485 ;          9155  GD_BLK_XFER ();                          !SET UP A GOOD BLOCK XFERR
20486 ;          9156  MLCS1 = write;                           !WRITE ZEROES IN FIRST BLOCK WORD LOCATION
20487 ;          9157                                          !OFFSETTING 14 NIBBLES WITH ZEROES ALSO.
20488 ;          9158  TIME_OUT_LOOP;
20489 ;          9159  CLR_MBUS;
20490 ;          9160  START = ZERO;                           !START AT THE FIRST BLOCK WORD
20491 ;          9161  FINISH = 14;                            !END AT THE 14'TH BLOCK WORD
20492 ;          9162  TST_PAT = ZEROES;                       !TEST FOR ZEROES IN FIRST 14 WORDS
20493 ;          9163  DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE XFERR
20494 ;          9164  MLCS1 = read;                            !DO A READ FUNCTION
20495 ;          9165  DELAY (ONE_US);
20496 ;          9166
20497 ;          9167  incr TWICE from 0 to 1 do               !READ WORDS 0-14 FOR 0'S AND 15-126 FOR 1'S
20498 ;          9168      begin
20499 ;          9169
20500 ;          9170      incr WRD_CNT from .START to .FINISH do   !READ BLOCK WORDS FORM START TO FINISH
20501 ;          9171          begin
20502 ;          9172          PD_TEMP = .MLPD;                !GET PROM DATA
20503 ;          9173          DAT_CLK = ONE;                  !CLOCK OUT THE DATA WORD
20504 ;          9174          DELAY (ONE_US);
20505 ;          9175          RD_LNG_WRD;                     !READ THE DATA DIAG REGISTERS
20506 ;          9176
20507 ;          9177          incr NIB_PTR from 0 to 8 do     !LOOK AT 9 NIBBLES
20508 ;          9178
20509 ;          9179              if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
20510 ;          9180              then
20511 ;          9181                  begin
20512 ;          9182                  TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);      !COMPARE NIBBLE WITH TST PAT
20513 ;          9183
20514 ;          9184                  if .ERR_FLG IS_SET      !SEE IF COMPARE FOUND AN ERROR
20515 ;          9185                  then
20516 ;          9186                      begin               !ERROR AND SET DODU_FLG IF ERROR FLG SET
20517 ;          9187                      CMP_THRESHOLD;      !COMPARE ERROR PRINT THRESHOLD
20518 ;          9188                      ERRDF (94, ARR_DAT, DUMPER);
20519 ;          9189                      PRINTB (THR_FMT, WRD_41, WRD_46, WRD_10);
20520 ;          9190                      PRINTB (FMT_6, .NIB_PTR);
```

```
20522 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20523 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (93)
20524
20525 ;          9191                       DODU_FLG = ONE;
20526 ;          9192                       end;
20527 ;          9193
20528 ;          9194                   end;
20529 ;          9195
20530 ;          9196               end;
20531 ;          9197
20532 ;          9198           TST_PAT = not .TST_PAT;          !NOW READ FOR ONES
20533 ;          9199           START = 15;                      !START A 15
20534 ;          9200           FINISH = 126;                    !END AT 126
20535 ;          9201           end
20536 ;          9202
20537 ;          9203   ENDSUB;
20538 ;          9204
20539 ;          9205   if .DODU_FLG IS_SET                      !DROP THIS UNIT IF DODU_FLG SET
20540 ;          9206   then
20541 ;          9207       begin
20542 ;          9208       DODU (.ML_LUN);
20543 ;          9209       DOCLN;
20544 ;          9210       end;
20545 ;          9211
20546 ;          9212   ENDTST;
20550
20551                                          .SBTTL  $T41 TEST CODE SECTION
20555 073452  004167  111134          $T41:   JSR     R1,$SAVE5                ;                          9085
20556 073456  162706  000012                  SUB     #12,SP
20557 073462  005067  121710                  CLR     P.CNT                    ;                          9127
20558 073466  104402                  1$:     TRAP    2                        ;                          9129
20559 073470  152777  000040  121746          BISB    #40,@ML.REG+40           ;                          9130
20560 073476  016704  122330                  MOV     ML.DUT,R4
20561 073502  042704  177770                  BIC     #177770,R4
20562 073506  142777  000007  121730          BICB    #7,@ML.REG+40
20563 073514  150477  121724                  BISB    R4,@ML.REG+40
20564 073520  005066  000004                  CLR     4(SP)                    ; DODU.FLG                 9132
20565 073524  005002                          CLR     R2                       ; WD.CNT                   9134
20566 073526  010203                  2$:     MOV     R2,R3                    ; WD.CNT,*                 9135
20567 073530  006303                          ASL     R3
20568 073532  012763  177777  014022          MOV     #-1,IO.BUF(R3)
20569 073540  005202                          INC     R2                       ; WD.CNT                   9134
20570 073542  020227  000377                  CMP     R2,#377                  ; WD.CNT,*
20571 073546  003767                          BLE     2$
20572 073550  005067  120246                  CLR     IO.BUF                   ;                          9137
20573 073554  005067  120244                  CLR     IO.BUF+2                 ;                          9138
20574 073560  012767  177760  120240          MOV     #-20,IO.BUF+4            ;                          9139
20575 073566  012777  177777  122000          MOV     #-1,@ML.REG+170          ;                          9140
20576 073574  012777  177777  122002          MOV     #-1,@ML.REG+200          ;                          9141
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

073602  012777  177777  121754                  MOV     #-1,@ML.REG+160                 ;                                       9142
073610  004767  122576                          JSR     PC,DAT.DM.XFER                  ;                                       9143
073614  012777  000061  121562                  MOV     #61,@ML.REG                     ;                                       9144
073622  005001                                  CLR     R1                              ; WD.CNT                                9146
073624  012702  000001                  3$:     MOV     #1,R2                           ; *,$$TMP2                              9148
073630  001411                          4$:     BEQ     7$
073632  016703  106260                          MOV     L$DLY,R3                        ; *,$$TMP1
073636  001404                                  BEQ     6$
073640  005066  000010                  5$:     CLR     10(SP)                          ; $$TMP
073644  005303                                  DEC     R3                              ; $$TMP1
073646  001374                                  BNE     5$
073650  005302                          6$:     DEC     R2                              ; $$TMP2
073652  000766                                  BR      4$
073654  152777  000020  121642          7$:     BISB    #20,@ML.REG+120                 ;                                       9149
073662  005201                                  INC     R1                              ; WD.CNT                                9146
073664  020127  000177                          CMP     R1,#177                         ; WD.CNT,*
073670  003755                                  BLE     3$
073672  152777  000040  121544                  BISB    #40,@ML.REG+40                  ;                                       9150
073700  016704  122126                          MOV     ML.DUT,R4
073704  042704  177770                          BIC     #177770,R4
073710  142777  000007  121526                  BICB    #7,@ML.REG+40
073716  150477  121522                          BISB    R4,@ML.REG+40
073722  012746  177777                          MOV     #-1,-(SP)                       ;                                       9153
073726  012746  000023                          MOV     #23,-(SP)
073732  004767  127512                          JSR     PC,WRT.PD
073736  152777  000100  121560                  BISB    #100,@ML.REG+120                ;                                       9154
073744  004767  124342                          JSR     PC,GD.BLK.XFER                  ;                                       9155
073750  012777  000061  121426                  MOV     #61,@ML.REG                     ;                                       9156
073756  105777  121472                  8$:     TSTB    @ML.REG+50
073762  100375                                  BPL     8$
073764  152777  000040  121452                  BISB    #40,@ML.REG+40                  ;                                       9158
073772  016704  122034                          MOV     ML.DUT,R4
073776  042704  177770                          BIC     #177770,R4
074002  142777  000007  121434                  BICB    #7,@ML.REG+40
074010  150477  121430                          BISB    R4,@ML.REG+40
074014  005066  000006                          CLR     6(SP)                           ; START                                 9160
074020  012766  000016  000004                  MOV     #16,4(SP)                       ; *,FINISH                              9161
074026  005005                                  CLR     R5                              ; TST.PAT                               9162
074030  004767  122356                          JSR     PC,DAT.DM.XFER                  ;                                       9163
074034  012777  000071  121342                  MOV     #71,@ML.REG                     ;                                       9164
074042  012702  000001                          MOV     #1,R2                           ; *,$$TMP2                              9165
074046  001411                          9$:     BEQ     12$
074050  016703  106042                          MOV     L$DLY,R3                        ; *,$$TMP1
074054  001404                                  BEQ     11$
074056  005066  000014                  10$:    CLR     14(SP)                          ; $$TMP
074062  005303                                  DEC     R3                              ; $$TMP1
074064  001374                                  BNE     10$
074066  005302                          11$:    DEC     R2                              ; $$TMP2
074070  000766                                  BR      9$
074072  005004                          12$:    CLR     R4                              ; TWICE                                 9167
074074  016601  000006                  13$:    MOV     6(SP),R1                        ; START,WRD.CNT                         9170
074100  005301                                  DEC     R1                              ; WRD.CNT
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

074102  000545                                  BR      23$
074104  017767  121524  121230  14$:           MOV     @ML.REG+230,PD.TEMP             ;                                       9172
074112  152777  000020  121404                  BISB    #20,@ML.REG+120                 ;                                       9173
074120  012702  000001                          MOV     #1,R2                           ; *,$$TMP2                              9174
074124  001411                  15$:            BEQ     18$
074126  016703  105764                          MOV     L$DLY,R3                        ; *,$$TMP1
074132  001404                                  BEQ     17$
074134  005066  000014          16$:            CLR     14(SP)                          ; $$TMP
074140  005303                                  DEC     R3                              ; $$TMP1
074142  001374                                  BNE     16$
074144  005302                  17$:            DEC     R2                              ; $$TMP2
074146  000766                                  BR      15$
074150  017767  121420  117216  18$:            MOV     @ML.REG+170,D1.TEMP
074156  017767  121422  117212                  MOV     @ML.REG+200,D2.TEMP
074164  017767  121374  117206                  MOV     @ML.REG+160,E2.TEMP
074172  005002                                  CLR     R2                              ; NIB.PTR                               9177
074174  010203                  19$:            MOV     R2,R3                           ; NIB.PTR,-                             9179
074176  006203                                  ASR     R3
074200  006203                                  ASR     R3
074202  006203                                  ASR     R3
074204  062703  015342                          ADD     #PD.TEMP,R3
074210  010346                                  MOV     R3,-(SP)
074212  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*
074214  042716  177770                          BIC     #177770,(SP)
074220  012746  000001                          MOV     #1,-(SP)
074224  005046                                  CLR     -(SP)
074226  004767  107402                          JSR     PC,BL$GT2
074232  062706  000010                          ADD     #10,SP
074236  005700                                  TST     R0
074240  001062                                  BNE     22$
074242  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*                             9182
074244  010546                                  MOV     R5,-(SP)                        ; TST.PAT,*
074246  012746  000020                          MOV     #20,-(SP)
074252  060616                                  ADD     SP,(SP)                         ; ERR.FLG,*
074254  004767  124116                          JSR     PC,TST.LNG.WRD
074260  026627  000020  000001                  CMP     20(SP),#1                       ; ERR.FLG,*                             9184
074266  001045                                  BNE     21$
074270  005267  121102                          INC     P.CNT                           ;                                       9186
074274  026767  121076  121076                  CMP     P.CNT,LIMIT
074302  003403                                  BLE     20$
074304  062706  000006                          ADD     #6,SP
074310  000442                                  BR      23$
074312  104455                  20$:            TRAP    55                              ;                                       9188
074314  000136                                  .WORD   136
074316  013012                                  .WORD   ARR.DAT
074320  026302                                  .WORD   DUMPER
074322  012746  010630                          MOV     #WRD.10,-(SP)                   ;                                       9189
074326  012746  011226                          MOV     #WRD.46,-(SP)
074332  012746  011154                          MOV     #WRD.41,-(SP)
074336  012746  010256                          MOV     #THR.FMT,-(SP)
074342  012746  000004                          MOV     #4,-(SP)
074346  010600                                  MOV     SP,R0                           ; SP,*
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

074350  104414                                  TRAP    14
074352  010216                                  MOV     R2,(SP)                         ; NIB.PTR,*                     9190
074354  012746  006752                          MOV     #FMT.6,-(SP)
074360  012746  000002                          MOV     #2,-(SP)
074364  010600                                  MOV     SP,R0                           ; SP,*
074366  104414                                  TRAP    14
074370  012766  000001  000034                  MOV     #1,34(SP)                       ; *,DODU.FLG                    9191
074376  062706  000016                          ADD     #16,SP                          ;                               9186
074402  062706  000006                  21$:    ADD     #6,SP                           ;                               9181
074406  005202                          22$:    INC     R2                              ; NIB.PTR                       9177
074410  020227  000010                          CMP     R2,#10                          ; NIB.PTR,*
074414  003667                                  BLE     19$
074416  005201                          23$:    INC     R1                              ; WRD.CNT                       9170
074420  020166  000004                          CMP     R1,4(SP)                        ; WRD.CNT,FINISH
074424  003627                                  BLE     14$
074426  005105                                  COM     R5                              ; TST.PAT                       9198
074430  012766  000017  000006                  MOV     #17,6(SP)                       ; *,START                       9199
074436  012766  000176  000004                  MOV     #176,4(SP)                      ; *,FINISH                      9200
074444  005204                                  INC     R4                              ; TWICE                         9167
074446  020427  000001                          CMP     R4,#1                           ; TWICE,*
074452  003610                                  BLE     13$
074454  022626                                  CMP     (SP)+,(SP)+                     ;                               9129
074456  104467                                  TRAP    67                              ;                               9201
074460  006000                                  ROR     R0
074462  103002                                  BHIS    24$
074464  000167  176776                          JMP     1$
074470  026627  000004  000001          24$:    CMP     4(SP),#1                        ; DODU.FLG,*                    9205
074476  001004                                  BNE     25$
074500  016700  121324                          MOV     ML.LUN,R0                       ;                               9208
074504  104451                                  TRAP    51
074506  104444                                  TRAP    44
074510  062706  000012                  25$:    ADD     #12,SP                          ;                               9085
074514  000207                                  RTS     PC

                                        ; Routine Size:  274 words
                                        ; Maximum stack depth per invocation:  23 words



                                                .SBTTL  T41 TEST CODE SECTION
074516                                  T41::
074516  004767  176730                  1$:     JSR     PC,$T41                         ;                               9210
```

```
20746                                   ;ML4AD                                  29-Mar-1982 16:23.04    TOPS
20747                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
20748
20749 074522  104466                              TRAP    66
20750 074524  006000                              ROR     R0
20751 074526  103773                              BLO     1$
20752 074530  000207                              RTS     PC
20753
20754                                   ; Routine Size:  6 words
20755                                   ; Maximum stack depth per invocation:  0 words
20760
20761
20762 ;         9213  !<BLF/PAGE>
```

```
20764 ;ML4AD
20765 ;                 TEST CODE SECTION
20766 ;
20767 ;          9214   !
20768 ;          9215   BGNTST;
20769 ;          9216
20770 ;          9217   !++
20771 ;          9218   ! TEST NUMBER:  TST 42
20772 ;          9219   !
20773 ;          9220   ! TEST NAME:    CS1 FUNCTION ABORT TEST
20774 ;          9221   !
20775 ;          9222   ! TEST DESCRIPTION:
20776 ;          9223   !       TEST CS1 FUNCTION ABORTS ON DETECTION OF CLASS 'A' & 'B' ERRORS BY:
20777 ;          9224   !
20778 ;          9225   !       1.  VIA MBUS WRITE FUNCTION LOAD THE GOOD BLOCK WITH BACKGROUND
20779 ;          9226   !           PATTERN OF ONES.
20780 ;          9227   !
20781 ;          9228   !       2.  CLEAR THE IO_BUF
20782 ;          9229   !
20783 ;          9230   !       3.  DO A MBUS READ FUNCTION.  WHILE THE READ IS IN PROGRESS WRITE TO
20784 ;          9231   !           MLDA (CLASS 'A' ERROR) READ THE IO_BUF FOR ONES.
20785 ;          9232   !
20786 ;          9233   !       4.  CLEAR THE IO_BUF
20787 ;          9234   !
20788 ;          9235   !       5.  VIA PROM R/W MODE FORCE UV ERROR TO THE UV ADRS ERROR PROM
20789 ;          9236   !           (CLASS 'B' ERROR).  DO A MBUS READ.
20790 ;          9237   !
20791 ;          9238   !       6.  READ IO_BUF FOR ZEROES
20792 ;          9239   !
20793 ;          9240   ! IMPLICIT INPUTS:
20794 ;          9241   !       IO_BUF
20795 ;          9242   !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND
20796 ;          9243   !       WRITE FUNCTION ARE FOUND.
20797 ;          9244   !--
20798 ;          9245
20799 ;          9246   CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
20800 ;          9247   CLR_MBUS;
20801 ;          9248   BAI = ONE;                              !SET ON FIRST IO_BUF ADRS
20802 ;          9249   IO_BUF = ONES;                          !LOAD FIRST IO_BUF ADRS
20803 ;          9250   GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
20804 ;          9251   MLCS1 = write;                          !WRITE BACKGROUND PATTERN
20805 ;          9252   TIME_OUT_LOOP;
20806 ;          9253
20807 ;          9254   incr TWICE from 0 to 1 do               !FORCE CLASS 'A' AND CLASS 'B' ERRORS
20808 ;          9255       begin
20809 ;          9256       BGNSUB;
20810 ;          9257       CLR_MBUS;
20811 ;          9258
20812 ;          9259       incr CNT from 0 to 255 do
20813 ;          9260           IO_BUF [.CNT] = ZEROES;         !CLEAR OUT IO_BUF
20814 ;          9261
20815 ;          9262       if .TWICE eql 1                     !IF 2ND PASS THEN FORCE 'B' ERROR
20816 ;          9263       then
20817 ;          9264           begin
20818 ;          9265           PROM_RW = ONE;
```

```
20820 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20821 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (94)
20822 ;
20823 ;          9266          MLPD = %o'777';
20824 ;          9267          end;
20825 ;          9268
20826 ;          9269      GD_BLK_XFER ();                       !SET UP A GOOD BLOCK XFERR
20827 ;          9270      MLCS1 = read;                         !DO A READ FUNCTION
20828 ;          9271
20829 ;          9272      if .TWICE eql 0 then MLDA = ONES;     !IF FIRST PASS THEN FORCE AN 'A' ERROR
20830 ;          9273
20831 ;          9274      TIME_OUT_LOOP;
20832 ;          9275
20833 ;          9276      if .TWICE eql 0                       !SEE WHICH PASS WE'RE ON
20834 ;          9277      then
20835 ;          9278          begin                             !CLASS 'A' ERROR
20836 ;          9279
20837 ;          9280          incr WRD_CNT from 0 to 64 do      !SEE IF XFERR WAY ALLOWED TO CONTINUE
20838 ;          9281              begin
20839 ;          9282
20840 ;          9283              if .IO_BUF [.WRD_CNT] neq ONES    !READ IO_BUF FOR BG PAT
20841 ;          9284              then
20842 ;          9285                  begin                     !ERROR AND EXIT LOOP IF ZEROES
20843 ;          9286                  CMP_THRESHOLD;            !COMPARE ERROR PRINT THRESHOLD
20844 ;          9287                  ERRDF (95, SYNC, DUMPER);
20845 ;          9288                  PRINTB (FOR_FMT, PHR_8, FNC_13, WRD_19, WRD_10);
20846 ;          9289                  exitloop;
20847 ;          9290                  end;
20848 ;          9291
20849 ;          9292              end;
20850 ;          9293
20851 ;          9294          end
20852 ;          9295      else                                  !CLASS 'B' ERROR
20853 ;          9296          begin
20854 ;          9297
20855 ;          9298          incr WRD_CNT from 0 to 64 do      !SEE IF XFERR WAS ABORTED
20856 ;          9299              begin
20857 ;          9300
20858 ;          9301              if .IO_BUF [.WRD_CNT] neq ZEROES  !READ IO_BUF CLEARED DATA
20859 ;          9302              then
20860 ;          9303                  begin                     !ERROR IF ONES AND EXIT LOOP
20861 ;          9304                  CMP_THRESHOLD;            !COMPARE ERROR PRINT THRESHOLD
20862 ;          9305                  ERRDF (96, SYNC, DUMPER);
20863 ;          9306                  PRINTB (FOR_FMT, PHR_9, FNC_13, WRD_19, WRD_10);
20864 ;          9307                  exitloop
20865 ;          9308                  end;
20866 ;          9309
20867 ;          9310              end;
20868 ;          9311
20869 ;          9312          end;
20870 ;          9313
20871 ;          9314      if .SC IS_NOT_SET                     !SEE IF SC BIT SET
20872 ;          9315      then
20873 ;          9316          begin                             !ERROR IF NOT SET
20874 ;          9317          ERRDF (104, SYNC, DUMPER);
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (94)

;          9318          PRINTB (FIV_FMT, WRD_59, PHR_1, WRD_11, WRD_19, FNC_13)
;          9319          end;
;          9320
;          9321      ENDSUB;
;          9322      end;
;          9323
;          9324  ENDTST;

                                        .SBTTL  $T42 TEST CODE SECTION
074532  004167  110016          $T42:   JSR     R1,$SAVE3                       ;                       9212
074536  005067  120634                  CLR     P.CNT                           ;                       9215
074542  152777  000040  120674          BISB    #40,@ML.REG+40                  ;                       9246
074550  016703  121256                  MOV     ML.DUT,R3
074554  042703  177770                  BIC     #177770,R3
074560  142777  000007  120656          BICB    #7,@ML.REG+40
074566  150377  120652                  BISB    R3,@ML.REG+40
074572  152777  000010  120644          BISB    #10,@ML.REG+40                  ;                       9248
074600  012767  177777  117214          MOV     #-1,IO.BUF                      ;                       9249
074606  004767  123500                  JSR     PC,GD.BLK.XFER                  ;                       9250
074612  012777  000061  120564          MOV     #61,@ML.REG                     ;                       9251
074620  105777  120630          1$:     TSTB    @ML.REG+50
074624  100375                          BPL     1$
074626  005003                          CLR     R3                              ; TWICE                 9254
074630  104402                  2$:     TRAP    2                               ;                       9255
074632  152777  000040  120604          BISB    #40,@ML.REG+40                  ;                       9256
074640  016702  121166                  MOV     ML.DUT,R2
074644  042702  177770                  BIC     #177770,R2
074650  142777  000007  120566          BICB    #7,@ML.REG+40
074656  150277  120562                  BISB    R2,@ML.REG+40
074662  005000                          CLR     R0                              ; CNT                   9259
074664  010001                  3$:     MOV     R0,R1                           ; CNT,*                 9260
074666  006301                          ASL     R1
074670  005061  014022                  CLR     IO.BUF(R1)
074674  005200                          INC     R0                              ; CNT                   9259
074676  020027  000377                  CMP     R0,#377                         ; CNT,*
074702  003770                          BLE     3$
074704  020327  000001                  CMP     R3,#1                           ; TWICE,*               9262
074710  001006                          BNE     4$
074712  152777  000100  120604          BISB    #100,@ML.REG+120                ;                       9265
074720  012777  000777  120706          MOV     #777,@ML.REG+230                ;                       9266
074726  004767  123360          4$:     JSR     PC,GD.BLK.XFER                  ;                       9269
074732  012777  000071  120444          MOV     #71,@ML.REG                     ;                       9270
074740  005002                          CLR     R2                              ;                       9272
074742  005703                          TST     R3                              ; TWICE
074744  001004                          BNE     5$
074746  005202                          INC     R2
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

074750  012777  177777  120456                  MOV     #-1,@ML.REG+30
074756  105777  120472                  5$:     TSTB    @ML.REG+50
074762  100375                                  BPL     5$
074764  006002                                  ROR     R2                      ;                                       9276
074766  103045                                  BCC     8$
074770  005002                                  CLR     R2                      ; WRD.CNT                               9280
074772  010201                          6$:     MOV     R2,R1                   ; WRD.CNT,*                             9283
074774  006301                                  ASL     R1
074776  026127  014022  177777                  CMP     IO.BUF(R1),#-1
075004  001431                                  BEQ     7$
075006  005267  120364                          INC     P.CNT                   ;                                       9285
075012  026767  120360  120360                  CMP     P.CNT,LIMIT
075020  003075                                  BGT     12$
075022  104455                                  TRAP    55                      ;                                       9287
075024  000137                                  .WORD   137
075026  012750                                  .WORD   SYNC
075030  026302                                  .WORD   DUMPER
075032  012746  010630                          MOV     #WRD.10,-(SP)           ;                                       9288
075036  012746  010730                          MOV     #WRD.19,-(SP)
075042  012746  012334                          MOV     #FNC.13,-(SP)
075046  012746  011762                          MOV     #PHR.8,-(SP)
075052  012746  010270                          MOV     #FOR.FMT,-(SP)
075056  012746  000005                          MOV     #5,-(SP)
075062  010600                                  MOV     SP,R0                   ; SP,*
075064  104414                                  TRAP    14
075066  000443                                  BR      10$                     ;                                       9289
075070  005202                          7$:     INC     R2                      ; WRD.CNT                               9280
075072  020227  000100                          CMP     R2,#100                 ; WRD.CNT,*
075076  003735                                  BLE     6$
075100  000445                                  BR      12$                     ;                                       9276
075102  005002                          8$:     CLR     R2                      ; WRD.CNT                               9298
075104  010201                          9$:     MOV     R2,R1                   ; WRD.CNT,*                             9301
075106  006301                                  ASL     R1
075110  005761  014022                          TST     IO.BUF(R1)
075114  001433                                  BEQ     11$
075116  005267  120254                          INC     P.CNT                   ;                                       9303
075122  026767  120250  120250                  CMP     P.CNT,LIMIT
075130  003031                                  BGT     12$
075132  104455                                  TRAP    55                      ;                                       9305
075134  000140                                  .WORD   140
075136  012750                                  .WORD   SYNC
075140  026302                                  .WORD   DUMPER
075142  012746  010630                          MOV     #WRD.10,-(SP)           ;                                       9306
075146  012746  010730                          MOV     #WRD.19,-(SP)
075152  012746  012334                          MOV     #FNC.13,-(SP)
075156  012746  011774                          MOV     #PHR.9,-(SP)
075162  012746  010270                          MOV     #FOR.FMT,-(SP)
075166  012746  000005                          MOV     #5,-(SP)
075172  010600                                  MOV     SP,R0                   ; SP,*
075174  104414                                  TRAP    14
075176  062706  000014                  10$:    ADD     #14,SP                  ;                                       9307
075202  000404                                  BR      12$
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

075204  005202                          11$:    INC     R2                          ; WRD.CNT                       9298
075206  020227  000100                          CMP     R2,#100                     ; WRD.CNT,*
075212  003734                                  BLE     9$
075214  032777  100000  120162          12$:    BIT     #100000,@ML.REG             ;                               9314
075222  001026                                  BNE     13$
075224  104455                                  TRAP    55                          ;                               9317
075226  000150                                  .WORD   150
075230  012750                                  .WORD   SYNC
075232  026302                                  .WORD   DUMPER
075234  012746  012334                          MOV     #FNC.13,-(SP)               ;                               9318
075240  012746  010730                          MOV     #WRD.19,-(SP)
075244  012746  010640                          MOV     #WRD.11,-(SP)
075250  012746  011610                          MOV     #PHR.1,-(SP)
075254  012746  011374                          MOV     #WRD.59,-(SP)
075260  012746  010304                          MOV     #FIV.FMT,-(SP)
075264  012746  000006                          MOV     #6,-(SP)
075270  010600                                  MOV     SP,R0                       ; SP,*
075272  104414                                  TRAP    14
075274  062706  000016                          ADD     #16,SP                      ;                               9316
075300  104467                          13$:    TRAP    67                          ;                               9319
075302  006000                                  ROR     R0
075304  103002                                  BHIS    15$
075306  000167  177316                  14$:    JMP     2$
075312  005203                          15$:    INC     R3                          ; TWICE                         9254
075314  020327  000001                          CMP     R3,#1                       ; TWICE,*
075320  003772                                  BLE     14$
075322  000207                                  RTS     PC                          ;                               9212

                                        ; Routine Size:  189 words
                                        ; Maximum stack depth per invocation:  11 words



                                                .SBTTL  T42 TEST CODE SECTION
075324                                  T42::
075324  004767  177202                  1$:     JSR     PC,$T42                     ;                               9322
075330  104466                                  TRAP    66
075332  006000                                  ROR     R0
075334  103773                                  BLO     1$
075336  000207                                  RTS     PC

                                        ; Routine Size:  6 words
```

```
21044                                   ;ML4AD
21045                                   ;                TEST CODE SECTION
21046
21047                                   ; Maximum stack depth per invocation:  0 words
21052
21053
21054 ;          9325  !<BLF/PAGE>
```

```
21056 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21057 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (95)
21058
21059 ;          9326  !
21060 ;          9327  !
21061 ;          9328  BGNTST;
21062 ;          9329
21063 ;          9330  !++
21064 ;          9331  ! TEST NUMBER:  TST 43
21065 ;          9332  !
21066 ;          9333  ! TEST NAME:    LAST BLOCK TRANSFER TEST
21067 ;          9334  !
21068 ;          9335  ! TEST DESCRIPTION:
21069 ;          9336  !
21070 ;          9337  !       TEST THE LAST BLOCK INDICATOR BIT
21071 ;          9338  !       FOR SETTING/NOT SETTING AND THE
21072 ;          9339  !       DSA REGISTER FOR INCREMENTING BY:
21073 ;          9340  !
21074 ;          9341  !       1.  DOING MBUS TRANSFERRS AT EACH
21075 ;          9342  !           BLOCK FROM BLOCK ZERO TO
21076 ;          9343  !           LAST BLOCK -1 AND TEST LBT
21077 ;          9344  !           CLEAR AND DSA REGISTER TO BE
21078 ;          9345  !           INCREMENTED.
21079 ;          9346  !
21080 ;          9347  !       2.  DO A MBUS TRANSFERR AT
21081 ;          9348  !           THE LAST BLOCK.
21082 ;          9349  !           TEST LBT TO BE SET AND
21083 ;          9350  !           TEST FOR CLEAR.
21084 ;          9351  !           TEST DSA REG TO BE INCREMENTED.
21085 ;          9352  !
21086 ;          9353  ! IMPLICIT INPUTS:
21087 ;          9354  !       IO_BUF
21088 ;          9355  !       A VECTOR OF 256 WORDS WHERE
21089 ;          9356  !       DATA FOR MBUS READS AND WRITE
21090 ;          9357  !       FUNCTION ARE FOUND.
21091 ;          9358  !
21092 ;          9359  !--
21093 ;          9360
21094 ;          9361  CLR_THRESHOLD;                                !CLEAR ERROR PRINT THRESHOLD
21095 ;          9362
21096 ;          9363  !
21097 ;          9364  !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
21098 ;          9365  !
21099 ;          9366  incrU DSA_CNT from 0 to .LST_BLK - 1 do          !DO XFERRS UP TO THE LAST BLOCK
21100 ;          9367      begin
21101 ;          9368      BGNSUB;
21102 ;          9369      CLR_MBUS;
21103 ;          9370      ECC_DIS = ONE;                            !DISABLE ECC
21104 ;          9371      MLWC = not 255;                           !LOAD WORD COUNT
21105 ;          9372      MLBA = IO_BUF;                            !LOAD UBUS ADRS
21106 ;          9373      MLDA = .DSA_CNT;                          !LOAD DSA WITH DSA_CNT
21107 ;          9374      MLCS1 = write;                            !DO A WRITE FUNCTION
21108 ;          9375      TIME_OUT_LOOP;
21109 ;          9376
21110 ;          9377      if .LBT IS_SET                            !SEE IF THE LAST BLOCK XFERR BIT SET
```

```
21112 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21113 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (95)
21114 ;
21115 ;          9378      then
21116 ;          9379          begin
21117 ;          9380          CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
21118 ;          9381          ERRDF (97, ASYNC, DUMPER);
21119 ;          9382          PRINTB (THR_FMT, WRD_27, PHR_5, WRD_29);
21120 ;          9383          PRINTB (FMT_7, .DSA_CNT);
21121 ;          9384          end;
21122 ;          9385
21123 ;          9386      if .MLDA neq .DSA_CNT + 1            !SEE IF THE DSA REG INCREMENTED
21124 ;          9387      then
21125 ;          9388          begin
21126 ;          9389          CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
21127 ;          9390          ERRDF (98, ASYNC, DUMPER);
21128 ;          9391          PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
21129 ;          9392          PRINTB (FMT_7, .DSA_CNT);
21130 ;          9393          end;
21131 ;          9394
21132 ;          9395      ENDSUB;
21133 ;          9396      end;
21134 ;          9397
21135 ;          9398  BGNSUB;
21136 ;          9399  CLR_MBUS;
21137 ;          9400  ECC_DIS = ONE;                           !DISABLE ECC
21138 ;          9401  LAST_BLK_XFER ();                        !SET UP A LAST BLOCK XFERR
21139 ;          9402  MLCST = write;                           !DO A WRITE FUNCTION
21140 ;          9403  TIME_OUT_LOOP;
21141 ;          9404
21142 ;          9405  if .MLDA neq .LST_BLK + 1                !SEE IF DSA REGISTER INCREMENTED
21143 ;          9406  then
21144 ;          9407      begin
21145 ;          9408      ERRDF (101, ASYNC, DUMPER);
21146 ;          9409      PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
21147 ;          9410      PRINTB (FMT_7, .LST_BLK);
21148 ;          9411      end;
21149 ;          9412
21150 ;          9413  if .LBT IS_SET                           !SEE IF LBT BIT SET
21151 ;          9414  then
21152 ;          9415      begin
21153 ;          9416      MLDA = ONES;                         !IF SET THEN TRY TO CLEAR IT
21154 ;          9417
21155 ;          9418      if .LBT IS_SET                       !SEE IF BIT CLEARED
21156 ;          9419      then
21157 ;          9420          begin                            !ERROR IF NOT
21158 ;          9421          ERRDF (99, ASYNC, DUMPER);
21159 ;          9422          PRINTB (FIV_FMT, WRD_27, PHR_2, WRD_11, WRD_17, REG_6);
21160 ;          9423          end;
21161 ;          9424
21162 ;          9425      end
21163 ;          9426  else                                     !LBT NOT SET
21164 ;          9427      begin
21165 ;          9428      ERRDF (100, ASYNC, DUMPER);
21166 ;          9429      PRINTB (FOR_FMT, WRD_27, PHR_1, WRD_11, WRD_27);
```

```
                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (95)

21168 ;ML4AD
21169 ;                 TEST CODE SECTION
21170
21171 ;          9430       end;
21172 ;          9431
21173 ;          9432  ENDSUB;
21174 ;          9433  ENDTST;
21178
21179                                       .SBTTL  $T43 TEST CODE SECTION
21183 075340  004167  107210          $T43: JSR     R1,$SAVE3                 ;                        9324
21184 075344  005067  120026                CLR     P.CNT                     ;                        9328
21185 075350  016703  116440                MOV     LST.BLK,R3                ;                        9366
21186 075354  005303                        DEC     R3
21187 075356  005001                        CLR     R1                        ; DSA.CNT
21188 075360  000551                        BR      7$
21189 075362  010102                  1$:   MOV     R1,R2                     ; DSA.CNT,*              9386
21190 075364  005202                        INC     R2
21191 075366  104402                  2$:   TRAP    2                         ;                        9367
21192 075370  152777  000040  120046        BISB    #40,@ML.REG+40            ;                        9368
21193 075376  016700  120430                MOV     ML.DUT,R0
21194 075402  042700  177770                BIC     #177770,R0
21195 075406  142777  000007  120030        BICB    #7,@ML.REG+40
21196 075414  150077  120024                BISB    R0,@ML.REG+40
21197 075420  152777  000002  120076        BISB    #2,@ML.REG+120            ;                        9370
21198 075426  012777  177400  117760        MOV     #-400,@ML.REG+10          ;                        9371
21199 075434  012777  014022  117762        MOV     #IO.BUF,@ML.REG+20        ;                        9372
21200 075442  010177  117766                MOV     R1,@ML.REG+30             ; DSA.CNT,*              9373
21201 075446  012777  000061  117730        MOV     #61,@ML.REG               ;                        9374
21202 075454  105777  117774          3$:   TSTB    @ML.REG+50
21203 075460  100375                        BPL     3$
21204 075462  032777  002000  117764        BIT     #2000,@ML.REG+50          ;                        9377
21205 075470  001437                        BEQ     4$
21206 075472  005267  117700                INC     P.CNT                     ;                        9379
21207 075476  026767  117674  117674        CMP     P.CNT,LIMIT
21208 075504  003076                        BGT     6$
21209 075506  104455                        TRAP    55                        ;                        9381
21210 075510  000141                        .WORD   141
21211 075512  012706                        .WORD   ASYNC
21212 075514  026302                        .WORD   DUMPER
21213 075516  012746  011032                MOV     #WRD.29,-(SP)             ;                        9382
21214 075522  012746  011714                MOV     #PHR.5,-(SP)
21215 075526  012746  011024                MOV     #WRD.27,-(SP)
21216 075532  012746  010256                MOV     #THR.FMT,-(SP)
21217 075536  012746  000004                MOV     #4,-(SP)
21218 075542  010600                        MOV     SP,R0                     ; SP,*
21219 075544  104414                        TRAP    14
21220 075546  010116                        MOV     R1,(SP)                   ; DSA.CNT,*              9383
21221 075550  012746  007002                MOV     #FMT.7,-(SP)
21222 075554  012746  000002                MOV     #2,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

075560  010600                                  MOV     SP,R0                           ; SP,*
075562  104414                                  TRAP    14
075564  062706  000016                          ADD     #16,SP                          ;                                 9379
075570  027702  117640                  4$:     CMP     @ML.REG+30,R2                   ;                                 9386
075574  001437                                  BEQ     5$
075576  005267  117574                          INC     P.CNT                           ;                                 9388
075602  026767  117570  117570                  CMP     P.CNT,LIMIT
075610  003034                                  BGT     6$
075612  104455                                  TRAP    55                              ;                                 9390
075614  000142                                  .WORD   142
075616  012706                                  .WORD   ASYNC
075620  026302                                  .WORD   DUMPER
075622  012746  010664                          MOV     #WRD.14,-(SP)                   ;                                 9391
075626  012746  011054                          MOV     #WRD.31,-(SP)
075632  012746  012540                          MOV     #REG.6,-(SP)
075636  012746  010256                          MOV     #THR.FMT,-(SP)
075642  012746  000004                          MOV     #4,-(SP)
075646  010600                                  MOV     SP,R0                           ; SP,*
075650  104414                                  TRAP    14
075652  010116                                  MOV     R1,(SP)                         ; DSA.CNT,*                       9392
075654  012746  007002                          MOV     #FMT.7,-(SP)
075660  012746  000002                          MOV     #2,-(SP)
075664  010600                                  MOV     SP,R0                           ; SP,*
075666  104414                                  TRAP    14
075670  062706  000016                          ADD     #16,SP                          ;                                 9388
075674  104467                          5$:     TRAP    67                              ;                                 9393
075676  006000                                  ROR     R0
075700  103632                                  BLO     2$
075702  005201                          6$:     INC     R1                              ; DSA.CNT                         9366
075704  020103                          7$:     CMP     R1,R3                           ; DSA.CNT,*
075706  101625                                  BLOS    1$
075710  104402                          8$:     TRAP    2                               ;                                 9396
075712  152777  000040  117524                  BISB    #40,@ML.REG+40                  ;                                 9398
075720  016703  120106                          MOV     ML.DUT,R3
075724  042703  177770                          BIC     #177770,R3
075730  142777  000007  117506                  BICB    #7,@ML.REG+40
075736  150377  117502                          BISB    R3,@ML.REG+40
075742  152777  000002  117554                  BISB    #2,@ML.REG+120                  ;                                 9400
075750  004767  122370                          JSR     PC,LAST.BLK.XFER                ;                                 9401
075754  012777  000061  117422                  MOV     #61,@ML.REG                     ;                                 9402
075762  105777  117466                  9$:     TSTB    @ML.REG+50
075766  100375                                  BPL     9$
075770  016701  116020                          MOV     LST.BLK,R1                      ;                                 9405
075774  005201                                  INC     R1
075776  027701  117432                          CMP     @ML.REG+30,R1
076002  001432                                  BEQ     10$
076004  104455                                  TRAP    55                              ;                                 9408
076006  000145                                  .WORD   145
076010  012706                                  .WORD   ASYNC
076012  026302                                  .WORD   DUMPER
076014  012746  010664                          MOV     #WRD.14,-(SP)                   ;                                 9409
076020  012746  011054                          MOV     #WRD.31,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

076024  012746  012540                          MOV     #REG.6,-(SP)
076030  012746  010256                          MOV     #THR.FMT,-(SP)
076034  012746  000004                          MOV     #4,-(SP)
076040  010600                                  MOV     SP,R0                           ; SP,*
076042  104414                                  TRAP    14
076044  016716  115744                          MOV     LST.BLK,(SP)                    ;                                9410
076050  012746  007002                          MOV     #FMT.7,-(SP)
076054  012746  000002                          MOV     #2,-(SP)
076060  010600                                  MOV     SP,R0                           ; SP,*
076062  104414                                  TRAP    14
076064  062706  000016                          ADD     #16,SP                          ;                                9407
076070  032777  002000  117356  10$:            BIT     #2000,@ML.REG+50                ;                                9413
076076  001436                                  BEQ     11$
076100  012777  177777  117326                  MOV     #-1,@ML.REG+30                  ;                                9416
076106  032777  002000  117340                  BIT     #2000,@ML.REG+50                ;                                9418
076114  001453                                  BEQ     12$
076116  104455                                  TRAP    55                              ;                                9421
076120  000143                                  .WORD   143
076122  012706                                  .WORD   ASYNC
076124  026302                                  .WORD   DUMPER
076126  012746  012540                          MOV     #REG.6,-(SP)                    ;                                9422
076132  012746  010712                          MOV     #WRD.17,-(SP)
076136  012746  010640                          MOV     #WRD.11,-(SP)
076142  012746  011626                          MOV     #PHR.2,-(SP)
076146  012746  011024                          MOV     #WRD.27,-(SP)
076152  012746  010304                          MOV     #FIV.FMT,-(SP)
076156  012746  000006                          MOV     #6,-(SP)
076162  010600                                  MOV     SP,R0                           ; SP,*
076164  104414                                  TRAP    14
076166  062706  000016                          ADD     #16,SP                          ;                                9420
076172  000424                                  BR      12$                             ;                                9413
076174  104455                  11$:            TRAP    55                              ;                                9428
076176  000144                                  .WORD   144
076200  012706                                  .WORD   ASYNC
076202  026302                                  .WORD   DUMPER
076204  012746  011024                          MOV     #WRD.27,-(SP)                   ;                                9429
076210  012746  010640                          MOV     #WRD.11,-(SP)
076214  012746  011610                          MOV     #PHR.1,-(SP)
076220  012746  011024                          MOV     #WRD.27,-(SP)
076224  012746  010270                          MOV     #FOR.FMT,-(SP)
076230  012746  000005                          MOV     #5,-(SP)
076234  010600                                  MOV     SP,R0                           ; SP,*
076236  104414                                  TRAP    14
076240  062706  000014                          ADD     #14,SP                          ;                                9427
076244  104467                  12$:            TRAP    67                              ;                                9430
076246  006000                                  ROR     R0
076250  103617                                  BLO     8$
076252  000207                                  RTS     PC                              ;                                9324

                                        ; Routine Size:  230 words
                                        ; Maximum stack depth per invocation:  11 words
```

```
21342
21343
21347
21348                                           .SBTTL  T43 TEST CODE SECTION
21352 076254                            T43::
21353 076254  004767  177060            1$:     JSR     PC,$T43                         ;                       9432
21354 076260  104466                            TRAP    66
21355 076262  006000                            ROR     R0
21356 076264  103773                            BLO     1$
21357 076266  000207                            RTS     PC
21358
21359                                   ; Routine Size:  6 words
21360                                   ; Maximum stack depth per invocation:  0 words
21365
21366
21367 ;         9434  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (96)

;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 44
;          !
;          ! TEST NAME:    INVALID ADRS TEST
;          !
;          ! TEST DESCRIPTION:
;          !
;          !       TEST THE DETECTION OF ILLEGAL DSA
;          !       ADDRESSES BY:
;          !
;          !       1.  DOING A MBUS WRITE FUNCTION
;          !           AT ALL POSSIBLE ILLEGAL DSA
;          !           ADDRESSES AND TEST THE
;          !           IAE BIT SET.
;          !
;          ! IMPLICIT INPUTS:
;          !
;          !       IO_BUF
;          !       A VECTOR OF 256 WORDS WHERE
;          !       DATA FOR MBUS READS AND WRITE
;          !       FUNCTION ARE FOUND.
;          !
;          !
;          !--
;
;          local
;              IAE_CNT;                                   !INVLID ADRS COUNT
;
;          CLR_THRESHOLD;                                 !CLEAR ERROR PRINT THRESHOLD
;          IAE_CNT = .LST_BLK;                            !START AT LAST  BLOCK + 1
;
;          do                                             !TEST FOR ALL INVALID ADDRESSES
;              begin
;              IAE_CNT = .IAE_CNT + 1;                    !INCREMENT IAE_CNT
;              BGNSUB;
;              CLR_MBUS;
;              MLDA = .IAE_CNT;                           !LOAD DSA
;              MLWC = not 255;                            !LOAD WORD COUNT
;              MLBA = IO_BUF;                             !LOAD UBUS ADRS
;              MLCS1 = write;                             !DO A WRITE FUNCTION
;
;              if .IAE IS_NOT_SET                         !SET IF IAE SET
;              then
;                  begin                                  !ERROR IF NOT SET
;                  CMP_THRESHOLD;                         !COMPARE ERROR PRINT THRESHOLD
;                  ERRDF (102, ASYNC, DUMPER);
;                  PRINTB (FIV_FMT, WRD_30, PHR_1, WRD_11, WRD_30, WRD_10);
;                  end;
```

```
21425 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21426 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (96)
21427
21428 ;          9487
21429 ;          9488      ENDSUB;
21430 ;          9489      end
21431 ;          9490  !
21432 ;          9491  !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
21433 ;          9492  !
21434 ;          9493  until .IAE_CNT eqlU %o'177777';              !REPEAT UNTIL ALL TESTED
21435 ;          9494
21436 ;          9495  ENDTST;
21440
21441                                          .SBTTL  $T44 TEST CODE SECTION
21445 076270  010146                  $T44:   MOV     R1,-(SP)                ;                                  9433
21446 076272  005067  117100                  CLR     P.CNT                   ;                                  9465
21447 076276  016701  115512                  MOV     LST.BLK,R1              ; *,IAE.CNT                        9468
21448 076302  005201                  1$:     INC     R1                      ; IAE.CNT                          9472
21449 076304  104402                  2$:     TRAP    2
21450 076306  152777  000040  117130          BISB    #40,@ML.REG+40          ;                                  9473
21451 076314  016700  117512                  MOV     ML.DUT,R0
21452 076320  042700  177770                  BIC     #177770,R0
21453 076324  142777  000007  117112          BICB    #7,@ML.REG+40
21454 076332  150077  117106                  BISB    R0,@ML.REG+40
21455 076336  010177  117072                  MOV     R1,@ML.REG+30           ; IAE.CNT,*                        9475
21456 076342  012777  177400  117044          MOV     #-400,@ML.REG+10        ;                                  9476
21457 076350  012777  014022  117046          MOV     #10.BUF,@ML.REG+20      ;                                  9477
21458 076356  012777  000061  117020          MOV     #61,@ML.REG             ;                                  9478
21459 076364  032777  002000  117072          BIT     #2000,@ML.REG+60        ;                                  9480
21460 076372  001034                          BNE     3$
21461 076374  005267  116776                  INC     P.CNT                   ;                                  9482
21462 076400  026767  116772  116772          CMP     P.CNT,LIMIT
21463 076406  003031                          BGT     4$
21464 076410  104455                          TRAP    55                      ;                                  9484
21465 076412  000146                          .WORD   146
21466 076414  012706                          .WORD   ASYNC
21467 076416  026302                          .WORD   DUMPER
21468 076420  012746  010630                  MOV     #WRD.10,-(SP)           ;                                  9485
21469 076424  012746  011046                  MOV     #WRD.30,-(SP)
21470 076430  012746  010640                  MOV     #WRD.11,-(SP)
21471 076434  012746  011610                  MOV     #PHR.1,-(SP)
21472 076440  012746  011046                  MOV     #WRD.30,-(SP)
21473 076444  012746  010304                  MOV     #FIV.FMT,-(SP)
21474 076450  012746  000006                  MOV     #6,-(SP)
21475 076454  010600                          MOV     SP,R0                   ; SP,*
21476 076456  104414                          TRAP    14
21477 076460  062706  000016                  ADD     #16,SP                  ;                                  9482
21478 076464  104467                  3$:     TRAP    67                      ;                                  9486
21479 076466  006000                          ROR     R0
```

```
                                ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                ;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<

076470  103705                          BLO     2$
076472  020127  177777          4$:     CMP     R1,#-1                  ; IAE.CNT,*                             9493
076476  001301                          BNE     1$
076500  012601                          MOV     (SP)+,R1                ;                                       9433
076502  000207                          RTS     PC

                                ; Routine Size:  70 words
                                ; Maximum stack depth per invocation:  8 words


                                        .SBTTL  T44 TEST CODE SECTION
076504                          T44::
076504  004767  177560          1$:     JSR     PC,$T44                 ;                                       9493
076510  104466                          TRAP    66
076512  006000                          ROR     R0
076514  103773                          BLO     1$
076516  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;         9496  !<BLF/PAGE>
```

```
                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (97)
21523 ;ML4AD
21524 ;                 TEST CODE SECTION
21525 ;
21526 ;          9497   !
21527 ;          9498   BGNTST;
21528 ;          9499
21529 ;          9500   !++
21530 ;          9501   ! TEST NUMBER:  TST 45
21531 ;          9502   !
21532 ;          9503   ! TEST NAME:    ADRS OVERFLOW BIT TEST
21533 ;          9504   !
21534 ;          9505   ! TEST DESCRIPTION:
21535 ;          9506   !       TEST THE DETECTION OF ADDRESS OVERFLOWS BY:
21536 ;          9507   !
21537 ;          9508   !       1.  STARTING AT THE LAST BLOCK DO A TWO BLOCK TRANSFER.
21538 ;          9509   !
21539 ;          9510   !       2.  READ THE AOE BIT SET.
21540 ;          9511   !
21541 ;          9512   ! IMPLICIT INPUTS:
21542 ;          9513   !       IO_BUF
21543 ;          9514   !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
21544 ;          9515   !       FUNCTIONS ARE FOUND.
21545 ;          9516   !--
21546 ;          9517
21547 ;          9518   CLR_MBUS;
21548 ;          9519   MLWC = not 511;                                 !DO TWO BLOCK XFERR
21549 ;          9520   MLBA = IO_BUF;                                  !LOAD UBUS ADRS
21550 ;          9521   MLDA = .LST_BLK;                                !START AT LAST BLOCK
21551 ;          9522   MLCS1 = write;                                  !DO A WRITE FUNCTION
21552 ;          9523   TIME_OUT_LOOP;
21553 ;          9524
21554 ;          9525   if .AOE IS_NOT_SET                              !SEE IF AOE SET
21555 ;          9526   then
21556 ;          9527       begin                                       !ERROR IF NOT SET
21557 ;          9528       ERRDF (103, SYNC, DUMPER);
21558 ;          9529       PRINTB (FOR_FMT, WRD_26, PHR_1, WRD_11, FNC_19);
21559 ;          9530       end;
21560 ;          9531
21561 ;          9532   ENDTST;
21565
21566                                           .SBTTL  $T45 TEST CODE SECTION
21570 076520  152777  000040  116716  $T45:    BISB    #40,@ML.REG+40          ;                    9498
21571 076526  016700  117300                   MOV     ML.DUT,R0
21572 076532  042700  177770                   BIC     #177770,R0
21573 076536  142777  000007  116700           BICB    #7,@ML.REG+40
21574 076544  150077  116674                   BISB    R0,@ML.REG+40
21575 076550  012777  177000  116636           MOV     #-1000,@ML.REG+10       ;                    9519
21576 076556  012777  014022  116640           MOV     #IO.BUF,@ML.REG+20      ;                    9520
21577 076564  016777  115224  116642           MOV     LST.BLK,@ML.REG+30      ;                    9521
```

```
21579                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
21580                                   ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
21581
21582 076572  012777  000061  116604            MOV     #61,@ML.REG                     ;                       9522
21583 076600  105777  116650           1$:      TSTB    @ML.REG+50
21584 076604  100375                            BPL     1$
21585 076606  032777  001000  116650            BIT     #1000,@ML.REG+60                ;                       9525
21586 076614  001024                            BNE     2$
21587 076616  104455                            TRAP    55                              ;                       9528
21588 076620  000147                            .WORD   147
21589 076622  012750                            .WORD   SYNC
21590 076624  026302                            .WORD   DUMPER
21591 076626  012746  012426                    MOV     #FNC.19,-(SP)                   ;                       9529
21592 076632  012746  010640                    MOV     #WRD.11,-(SP)
21593 076636  012746  011610                    MOV     #PHR.1,-(SP)
21594 076642  012746  011016                    MOV     #WRD.26,-(SP)
21595 076646  012746  010270                    MOV     #FOR.FMT,-(SP)
21596 076652  012746  000005                    MOV     #5,-(SP)
21597 076656  010600                            MOV     SP,R0                           ; SP,*
21598 076660  104414                            TRAP    14
21599 076662  062706  000014                    ADD     #14,SP                          ;                       9527
21600 076666  000207           2$:      RTS     PC                                      ;                       9495
21601
21602                                   ; Routine Size:  52 words
21603                                   ; Maximum stack depth per invocation:  6 words
21608
21609
21613
21614                                           .SBTTL  T45 TEST CODE SECTION
21618 076670                            T45::
21619 076670  004767  177624           1$:      JSR     PC,$T45                         ;                       9530
21620 076674  104466                            TRAP    66
21621 076676  006000                            ROR     R0
21622 076700  103773                            BLO     1$
21623 076702  000207                            RTS     PC
21624
21625                                   ; Routine Size:  6 words
21626                                   ; Maximum stack depth per invocation:  0 words
21631
21632
21633 ;         9533  !<BLF/PAGE>
```

```
21635 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21636 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (98)
21637 ;
21638 ;          9534  !
21639 ;          9535  BGNTST;
21640 ;          9536
21641 ;          9537  !++
21642 ;          9538  ! TEST NUMBER:  TST 46
21643 ;          9539  !
21644 ;          9540  ! TEST NAME:    SYNC BUS PARITY TEST
21645 ;          9541  !
21646 ;          9542  ! TEST DESCRIPTION:
21647 ;          9543  !       TEST ABILITY OF SYNC BUS TO DETECT AND GENERATE
21648 ;          9544  !       GOOD PARITY BY:
21649 ;          9545  !
21650 ;          9546  !       1.  VIA MBUS WRITE FUNCTION WRITE ALTERNATING ONES AND ZEROES TO THE
21651 ;          9547  !           DEVICE AND READ THE DPAR BIT CLEARED.
21652 ;          9548  !
21653 ;          9549  !       2.  REPEAT WITH SHIFTED DATA
21654 ;          9550  !
21655 ;          9551  !       3.  VIA MBUS READ FUNCTION READ THE ALTERNATING PATTERN AND MDPE CLEARED.
21656 ;          9552  !
21657 ;          9553  ! IMPLICIT INPUTS:
21658 ;          9554  !       IO_BUF
21659 ;          9555  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITES
21660 ;          9556  !       FUNCTIONS ARE FOUND.
21661 ;          9557  !--
21662 ;          9558
21663 ;          9559  if .PAR_DIS IS_SET                          !SEE IF PARITY IS DISABLED
21664 ;          9560  then
21665 ;          9561      begin                                   !PRINT MESSAGE AND EXIT TST IF YES
21666 ;          9562      PRINTB (THR_FMT, FNC_3, WRD_7, WRD_37);
21667 ;          9563      EXIT_TST;
21668 ;          9564      end;
21669 ;          9565
21670 ;          9566  CLR_MBUS;
21671 ;          9567  BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
21672 ;          9568  IO_BUF = %o'125252';                        !ALTERNATE 1, 0 PATTERN
21673 ;          9569
21674 ;          9570  incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
21675 ;          9571      begin
21676 ;          9572      BGNSUB;
21677 ;          9573      GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
21678 ;          9574      MLCS1 = write;                          !DO A WRITE FUNCTION
21679 ;          9575      TIME_OUT_LOOP;
21680 ;          9576
21681 ;          9577      if .DPAR IS_SET                         !SEE IF DPAR GOT SET
21682 ;          9578      then
21683 ;          9579          begin                               !ERROR IF SET
21684 ;          9580          ERRDF (105, SYNC, DUMPER);
21685 ;          9581          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_9);
21686 ;          9582          end;
21687 ;          9583
21688 ;          9584      IO_BUF = .IO_BUF^ONE;                   !SHIFT THE IO_BUF & REPEAT
21689 ;          9585      MLER = ZEROES;                          !CLEAR OUT ERROR REG & REPEAT
```

```
21691 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 BLiss-16 V2(212)
21692 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (98)
21693
21694 ;          9586      ENDSUB;
21695 ;          9587      end;
21696 ;          9588
21697 ;          9589  incr TWICE from 0 to 1 do                 !REPEATE LOOP TWICE
21698 ;          9590      begin
21699 ;          9591      BGNSUB;
21700 ;          9592      CLR_MBUS;
21701 ;          9593      BAI = ONE;                            !SET ON FIRST IO_BUF ADRS
21702 ;          9594      GD_BLK_XFER ();                       !SET UP A GOOD BLOCK XFERR
21703 ;          9595      MLCS1 = read;                         !DO A READ XFERR
21704 ;          9596      TIME_OUT_LOOP;
21705 ;          9597
21706 ;          9598      if .MDPE IS_SET                       !SEE IF READ GENERATED BAD PARITY
21707 ;          9599      then
21708 ;          9600          begin                             !ERROR IF MDPE SET
21709 ;          9601          ERRDF (106, SYNC, DUMPER);
21710 ;          9602          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_8);
21711 ;          9603          end;
21712 ;          9604
21713 ;          9605      ENDSUB;
21714 ;          9606      IO_BUF = .IO_BUF^ONE;                 !MAKE DATA PATTERN HAVE ONE LESS ONE
21715 ;          9607      GD_BLK_XFER ();                       !SET UP A GOOD BLK XFER
21716 ;          9608      MLCS1 = write;                        !CHANGE THE BACKGROUND IN MEMORY
21717 ;          9609      TIME_OUT_LOOP;
21718 ;          9610      end;
21719 ;          9611
21720 ;          9612  ENDTST;
21724
21725                                        .SBTTL  $T46 TEST CODE SECTION
21729 076704  010146                 $T46:   MOV     R1,-(SP)                ;                          9532
21730 076706  026727  115076  000001        CMP     PAR.DIS,#1              ;                          9559
21731 076714  001021                        BNE     1$
21732 076716  012746  011122                MOV     #WRD.37,-(SP)           ;                          9562
21733 076722  012746  010566                MOV     #WRD.7,-(SP)
21734 076726  012746  012172                MOV     #FNC.3,-(SP)
21735 076732  012746  010256                MOV     #THR.FMT,-(SP)
21736 076736  012746  000004                MOV     #4,-(SP)
21737 076742  010600                        MOV     SP,R0                   ; SP,*
21738 076744  104414                        TRAP    14
21739 076746  104463                        TRAP    63
21740 076750  062706  000012                ADD     #12,SP                  ;                          9559
21741 076754  000167  000402                JMP     9$                      ;                          9561
21742 076760  152777  000040  116456  1$:   BISB    #40,@ML.REG+40          ;                          9564
21743 076766  016701  117040                MOV     ML.DUT,R1
21744 076772  042701  177770                BIC     #177770,R1
21745 076776  142777  000007  116440        BICB    #7,@ML.REG+40
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

077004  150177  116434                          BISB    R1,@ML.REG+40
077010  152777  000010  116426                  BISB    #10,@ML.REG+40                  ;                                       9567
077016  012767  125252  114776                  MOV     #-52526,IO.BUF                  ;                                       9568
077024  005001                                  CLR     R1                              ; TWICE                                 9570
077026  104402                          2$:     TRAP    2                               ;                                       9571
077030  004767  121256                          JSR     PC,GD.BLK.XFER                  ;                                       9573
077034  012777  000061  116342                  MOV     #61,@ML.REG                     ;                                       9574
077042  105777  116406                  3$:     TSTB    @ML.REG+50
077046  100375                                  BPL     3$
077050  132777  000040  116406                  BITB    #40,@ML.REG+60                  ;                                       9577
077056  001424                                  BEQ     4$
077060  104455                                  TRAP    55                              ;                                       9580
077062  000151                                  .WORD   151
077064  012750                                  .WORD   SYNC
077066  026302                                  .WORD   DUMPER
077070  012746  010616                          MOV     #WRD.9,-(SP)                    ;                                       9581
077074  012746  010566                          MOV     #WRD.7,-(SP)
077100  012746  010560                          MOV     #WRD.6,-(SP)
077104  012746  010766                          MOV     #WRD.23,-(SP)
077110  012746  010270                          MOV     #FOR.FMT,-(SP)
077114  012746  000005                          MOV     #5,-(SP)
077120  010600                                  MOV     SP,R0                           ; SP,*
077122  104414                                  TRAP    14
077124  062706  000014                          ADD     #14,SP                          :                                       9579
077130  006367  114666                  4$:     ASL     IO.BUF                                                                  9584
077134  005077  116324                          CLR     @ML.REG+60                      ;                                       9585
077140  104467                                  TRAP    67
077142  006000                                  ROR     R0
077144  103730                                  BLO     2$
077146  005201                                  INC     R1                              ; TWICE                                 9570
077150  020127  000001                          CMP     R1,#1                           ; TWICE,*
077154  003724                                  BLE     2$
077156  005001                                  CLR     R1                              ; TWICE                                 9589
077160  104402                          5$:     TRAP    2                               ;                                       9590
077162  152777  000040  116254                  BISB    #40,@ML.REG+40                  ;                                       9591
077170  016700  116636                          MOV     ML.DUT,R0
077174  042700  177770                          BIC     #177770,R0
077200  142777  000007  116236                  BICB    #7,@ML.REG+40
077206  150077  116232                          BISB    R0,@ML.REG+40
077212  152777  000010  116224                  BISB    #10,@ML.REG+40                  ;                                       9593
077220  004767  121066                          JSR     PC,GD.BLK.XFER                  ;                                       9594
077224  012777  000071  116152                  MOV     #71,@ML.REG                     ;                                       9595
077232  105777  116216                  6$:     TSTB    @ML.REG+50
077236  100375                                  BPL     6$
077240  032777  000400  116176                  BIT     #400,@ML.REG+40                 ;                                       9598
077246  001424                                  BEQ     7$
077250  104455                                  TRAP    55                              ;                                       9601
077252  000152                                  .WORD   152
077254  012750                                  .WORD   SYNC
077256  026302                                  .WORD   DUMPER
077260  012746  010602                          MOV     #WRD.8,-(SP)                    ;                                       9602
077264  012746  010566                          MOV     #WRD.7,-(SP)
```

```
21803                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
21804                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
21805
21806 077270  012746  010560                     MOV     #WRD.6,-(SP)
21807 077274  012746  010766                     MOV     #WRD.23,-(SP)
21808 077300  012746  010270                     MOV     #FOR.FMT,-(SP)
21809 077304  012746  000005                     MOV     #5,-(SP)
21810 077310  010600                             MOV     SP,R0                           ; SP,*
21811 077312  104414                             TRAP    14
21812 077314  062706  000014                     ADD     #14,SP                          ;                               9600
21813 077320  104467                   7$:       TRAP    67                              ;                               9603
21814 077322  006000                             ROR     R0
21815 077324  103715                             BLO     5$
21816 077326  006367  114470                     ASL     IO.BUF                          ;                               9606
21817 077332  004767  120754                     JSR     PC,GD.BLK.XFER                  ;                               9607
21818 077336  012777  000061  116040             MOV     #61,@ML.REG                     ;                               9608
21819 077344  105777  116104             8$:     TSTB    @ML.REG+50
21820 077350  100375                             BPL     8$
21821 077352  005201                             INC     R1                              ; TWICE                         9589
21822 077354  020127  000001                     CMP     R1,#1                           ; TWICE,*
21823 077360  003677                             BLE     5$
21824 077362  012601                   9$:       MOV     (SP)+,R1                        ;                               9532
21825 077364  000207                             RTS     PC
21826
21827                                   ; Routine Size:  153 words
21828                                   ; Maximum stack depth per invocation:  7 words
21833
21834
21838
21839                                           .SBTTL  T46 TEST CODE SECTION
21843 077366                           T46::
21844 077366  004767  177312           1$:       JSR     PC,$T46                         ;                               9610
21845 077372  104466                             TRAP    66
21846 077374  006000                             ROR     R0
21847 077376  103773                             BLO     1$
21848 077400  000207                             RTS     PC
21849
21850                                   ; Routine Size:  6 words
21851                                   ; Maximum stack depth per invocation:  0 words
21856
21857 ;         9613  !<BLF/PAGE>
```

```
21859 ;ML4AD
21860 ;                 TEST CODE SECTION
21861
21862 ;          9614   !
21863 ;          9615   !
21864 ;          9616   BGNTST;
21865 ;          9617
21866 ;          9618   !++
21867 ;          9619   ! TEST NUMBER:  TST 47
21868 ;          9620   !
21869 ;          9621   ! TEST NAME:    WRITE READ ML11
21870 ;          9622   !
21871 ;          9623   ! TEST DESCRIPTION:
21872 ;          9624   !
21873 ;          9625   !       PROVIDES A MBUS READ/WRITE
21874 ;          9626   !       DATA TRANSFER TROUBLE SHOOTING
21875 ;          9627   !       LOOP BY:
21876 ;          9628   !
21877 ;          9629   !       1.  LOAD APPROPRIATE RH REGISTERS.
21878 ;          9630   !           DO A WRITE FUNCTION.
21879 ;          9631   !
21880 ;          9632   !       2.  LOAD APPROPRIATE RH REGISTERS
21881 ;          9633   !           DO A WRITE CHECK FUNCTION.
21882 ;          9634   !
21883 ;          9635   !       3.  COMPLIMENT DATA AND
21884 ;          9636   !           REPEAT.
21885 ;          9637   !
21886 ;          9638   ! IMPLICIT INPUTS:
21887 ;          9639   !
21888 ;          9640   !       IO_BUF
21889 ;          9641   !       A VECTOR OF 256 WORDS WHERE
21890 ;          9642   !       DATA FOR MBUS READ AND WRITE
21891 ;          9643   !       FUNCTIONS IS FOUND.
21892 ;          9644   !
21893 ;          9645   !--
21894 ;          9646
21895 ;          9647   local
21896 ;          9648       TST_PAT;                          !TEST PATTERN
21897 ;          9649
21898 ;          9650   TST_PAT = %o'052525';
21899 ;          9651
21900 ;          9652   incr TWICE from 0 to 1 do             !WRITE READ 1'S AND 0'S ON MBUS
21901 ;          9653       begin
21902 ;          9654       CLR_MBUS;
21903 ;          9655       BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
21904 ;          9656       IO_BUF = .TST_PAT;                !LOAD FIRST IO_BUF ADRS
21905 ;          9657       GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
21906 ;          9658       MLCS1 = write;                    !DO A WRITE FUNCTION
21907 ;          9659       TIME_OUT_LOOP;
21908 ;          9660       CLR_MBUS;
21909 ;          9661       BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
21910 ;          9662       GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
21911 ;          9663       MLCS1 = WRT_CHK;                  !DO A WRITE CHECK FUNCTION
21912 ;          9664       TIME_OUT_LOOP;
21913 ;          9665
```

```
21915 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21916 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (99)
21917
21918 ;          9666       if .WCE IS_SET                      !SEE IF WRITE CHECK ERROR SET
21919 ;          9667       then
21920 ;          9668           begin                           !ERROR IF SET
21921 ;          9669           ERRDF (109, TRBLE_LOOP, DUMPFR);
21922 ;          9670           PRINTB (SIX_FMT, FNC_4, WRD_10, WRD_12, FNC_5, FNC_6, FNC_3);
21923 ;          9671           end;
21924 ;          9672
21925 ;          9673       TST_PAT = not .TST_PAT;             !COMPLIMENT TST_PAT AND REPEAT
21926 ;          9674       end;
21927 ;          9675
21928 ;          9676   ENDTST;
21932
21933                                          .SBTTL  $T47 TEST CODE SECTION
21937 077402  004167  105132          $T47:   JSR     R1,$SAVE2                       ;                       9612
21938 077406  012701  052525                  MOV     #52525,R1                       ; *,TST.PAT             9650
21939 077412  005002                          CLR     R2                              ; TWICE                 9652
21940 077414  152777  000040  116022  1$:     BISB    #40,@ML.REG+40                  ;                       9653
21941 077422  016700  116404                  MOV     ML.DUT,R0
21942 077426  042700  177770                  BIC     #177770,R0
21943 077432  142777  000007  116004          BICB    #7,@ML.REG+40
21944 077440  150077  116000                  BISB    R0,@ML.REG+40
21945 077444  152777  000010  115772          BISB    #10,@ML.REG+40                  ;                       9655
21946 077452  010167  114344                  MOV     R1,IO.BUF                       ; TST.PAT,*             9656
21947 077456  004767  120630                  JSR     PC,GD.BLK.XFER                  ;                       9657
21948 077462  012777  000061  115714          MOV     #61,@ML.REG                     ;                       9658
21949 077470  105777  115760          2$:     TSTB    @ML.REG+50
21950 077474  100375                          BPL     2$
21951 077476  152777  000040  115740          BISB    #40,@ML.REG+40                  ;                       9659
21952 077504  016700  116322                  MOV     ML.DUT,R0
21953 077510  042700  177770                  BIC     #177770,R0
21954 077514  142777  000007  115722          BICB    #7,@ML.REG+40
21955 077522  150077  115716                  BISB    R0,@ML.REG+40
21956 077526  152777  000010  115710          BISB    #10,@ML.REG+40                  ;                       9661
21957 077534  004767  120552                  JSR     PC,GD.BLK.XFER                  ;                       9662
21958 077540  012777  000051  115636          MOV     #51,@ML.REG                     ;                       9663
21959 077546  105777  115702          3$:     TSTB    @ML.REG+50
21960 077552  100375                          BPL     3$
21961 077554  032777  040000  115662          BIT     #40000,@ML.REG+40               ;                       9666
21962 077562  001430                          BEQ     4$
21963 077564  104455                          TRAP    55                              ;                       9669
21964 077566  000155                          .WORD   155
21965 077570  013250                          .WORD   TRBLE.LOOP
21966 077572  026702                          .WORD   DUMPER
21967 077574  012746  012172                  MOV     #FNC.3,-(SP)                    ;                       9670
21968 077600  012746  012226                  MOV     #FNC.6,-(SP)
21969 077604  012746  012216                  MOV     #FNC.5,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

077610  012746  010650                          MOV     #WRD.12,-(SP)
077614  012746  010630                          MOV     #WRD.10,-(SP)
077620  012746  012200                          MOV     #FNC.4,-(SP)
077624  012746  010322                          MOV     #SIX.FMT,-(SP)
077630  012746  000007                          MOV     #7,-(SP)
077634  010600                                  MOV     SP,R0                           ; SP,*
077636  104414                                  TRAP    14
077640  062706  000020                          ADD     #20,SP                          ;                                9668
077644  005101                          4$:     COM     R1                              ; TST.PAT                        9673
077646  005202                                  INC     R2                              ; TWICE                          9652
077650  020227  000001                          CMP     R2,#1                           ; TWICE,*
077654  003657                                  BLE     1$
077656  000207                                  RTS     PC                              ;                                9612

                                        ; Routine Size:  87 words
                                        ; Maximum stack depth per invocation:  11 words



                                                .SBTTL  T47 TEST CODE SECTION
077660                                  T47::
077660  004767  177516                  1$:     JSR     PC,$T47                         ;                                9674
077664  104466                                  TRAP    66
077666  006000                                  ROR     R0
077670  103773                                  BLO     1$
077672  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;           9677  !<BLF/PAGE>
```

29-Mar-1982 16:23:04 TOPS-20 Bliss-16 V2(212)
29-Mar-1982 16:21:03 PA:<NEALE>ML4AD.BLI.4 (100)

```
22021 ;ML4AD
22022 ;                 TEST CODE SECTION
22023 ;
22024 ;          9678   !
22025 ;          9679   BGNTST;
22026 ;          9680
22027 ;          9681   !++
22028 ;          9682   ! TEST NUMBER:  TST 48
22029 ;          9683   !
22030 ;          9684   ! TEST NAME:    CRC DATA BUS TEST
22031 ;          9685   !
22032 ;          9686   ! TEST DESCRIPTION:
22033 ;          9687   !       TEST THE CRC DATA BUS BETWEEN THE CRC
22034 ;          9688   !       GENERATORS AND THE CRC/MBUS DATA
22035 ;          9689   !       MUX FOR CONTINUITY AND BIT UNIQUENESS
22036 ;          9690   !       BY:
22037 ;          9691   !
22038 ;          9692   !       1.  WHILE IN ECC DIAGNOSTIC MODE DO
22039 ;          9693   !           GOOD BLOCK TRANSFERS WITH VARIOUS
22040 ;          9694   !           CRC_A,CRC_B AND PAR_CRC_WRD WHICH
22041 ;          9695   !           WILL EXERCISE BUS CONTINUITY AND
22042 ;          9696   !           UNIQUENESS.
22043 ;          9697   !
22044 ;          9698   !       2.  THEN IN DATA DIAGNOSTEC MODE READ
22045 ;          9699   !           THE CRC NIBBLES FROM ONE CRC GROUP
22046 ;          9700   !           FOR CORRECT CRC_A,CRC_B AND PAR_CRC_WRD
22047 ;          9701   !           DATA PATTERNS.
22048 ;          9702   !
22049 ;          9703   ! IMPLICIT INPUTS:
22050 ;          9704   !       PD_TEMP
22051 ;          9705   !       A BIT VECTOR OF 16 BITS WHERE THE READ
22052 ;          9706   !       PROM DATA IS STORED OAND ACCESSED FROM.
22053 ;          9707   !
22054 ;          9708   !
22055 ;          9709   !--
22056 ;          9710
22057 ;          9711   local
22058 ;          9712       TMP_E1,                      !TEMP STORAGE FOR E1 DATA WORD
22059 ;          9713       DODO_FLG,                    !DROP UNIT FLAG
22060 ;          9714       CRC_NIB,                     !POINTER TO THE CRC NIBBLE
22061 ;          9715       CRC_TSTED,                   !STORES HOW MANY CRC NIBBLES WE HAVE TESTED
22062 ;          9716       ERR_FLG,                     !ERROR FLAG
22063 ;          9717       NIB_PAT;                     !TEST DATA FOR THE CRC NIBBLE
22064 ;          9718
22065 ;          9719   CLR_THRESHOLD;                   !CLEAR ERROR PRINT THRESHOLD
22066 ;          9720   CRC_NIB = 9;                     !SET CRC NIBBLE POINTER
22067 ;          9721   DODO_FLG = ZERO;                 !CLEAR THE DROP UNIT FLAG
22068 ;          9722
22069 ;          9723   incr LOOP from 0 to 4 do         !REPEAT THE TEST WITH FIVE NIBBLE PATTERNS
22070 ;          9724       begin
22071 ;          9725       BGNSUB;                      !START OF THE SCOPE LOOP
22072 ;          9726       CLR_MBUS;
22073 ;          9727       ECC_DM = ONE;                !SET ECC DIAG MOD
22074 ;          9728
22075 ;          9729       case .LOOP from 0 to 4 of    !SELECT ONE OF THE FIVE NIBBLE PATTERNS
```

```
22077 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22078 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (100)
22079
22080 ;          9730          set
22081 ;          9731
22082 ;          9732          [0] :                                   !PATTERN 0
22083 ;          9733              NIB_PAT = %b'110';
22084 ;          9734
22085 ;          9735          [1] :                                   !PATTERN 1
22086 ;          9736              begin
22087 ;          9737              MLE1 = ONES;
22088 ;          9738              MLE2 = ONES;
22089 ;          9739              NIB_PAT = %b'001';
22090 ;          9740              end;
22091 ;          9741
22092 ;          9742          [2] :                                   !PATTERN 2
22093 ;          9743              begin
22094 ;          9744              CRC_A = ONES;
22095 ;          9745              CRC_B = ONES;
22096 ;          9746              NIB_PAT = %b'000';
22097 ;          9747              end;
22098 ;          9748
22099 ;          9749          [3] :                                   !PATTERN 3
22100 ;          9750              begin
22101 ;          9751              PAR_CRC_WRD = ONES;
22102 ;          9752              CRC_B = ONES;
22103 ;          9753              NIB_PAT = %b'011';
22104 ;          9754              end;
22105 ;          9755
22106 ;          9756          [4] :                                   !PATTERN 4
22107 ;          9757              begin
22108 ;          9758          !+
22109 ;          9759          ! THE FOLLOWING ASSIGNMENT:
221?0 ;          9760          !
22111 ;          9761          !       MLE1 = .TMP_E1
22112 ;          9762          !
22113 ;          9763          ! IS EQUIVALENT TO THE FOLLOWING
22114 ;          9764          ! TWO ASSIGNMENTS:
22115 ;          9765          !
22116 ;          9766          !   PAR_CRC_WRD = ONES;          !LOAD PAR_CRC_WRD WITH REM_TBL
22117 ;          9767          !   CRC_A = ONES;                !LOAD CRC_A WITH REM_TBL
22118 ;          9768          !
22119 ;          9769          ! THIS IS NECESSARY DUE TO THE FACT THAT
22120 ;          9770          ! THE E1 REGISTER IS WORD ORIENTATED AND
22121 ;          9771          ! THE BLISS COMPILER GENERATES BYTE INST
22122 ;          9772          ! TO ACCESS THE REGISTER.
22123 ;          9773          !-
22124 ;          9774
22125 ;          9775              TMP_E1 = ZEROES;                !CLEAR OUT THE TEMP WORD
22126 ;          9776              TMP_E1<0, 6> = ONES;            !LOAD CRC_A WITH REM_TBL
22127 ;          9777              TMP_E1<8, 6> = ONES;            !LOAD PAR_CRC_WRD WITH REM_TBL
22128 ;          9778              MLE1 = .TMP_E1;                 !LOAD THE E1 REGISTER WITH DATA
22129 ;          9779
22130 ;          9780              NIB_PAT = %b'101';
22131 ;          9781              end;
```

```
22133 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22134 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (100)
22135 ;
22136 ;          9782           tes;
22137 ;          9783
22138 ;          9784       GD_BLK_XFER ();                      !SET UP A GOOD BLOCK TRANSFER
22139 ;          9785       ML_CS1 = write;                      !DO A WRITE TRANSFER
22140 ;          9786       TIME_OUT_LOOP;                       !WAIT UNTIL DRIVE READY
22141 ;          9787       DAT_DM = ONE;                        !SET DATA DIAG MODE
22142 ;          9788       GD_BLK_XFER ();                      !SET UP A GOOD BLOCK TRANSFER
22143 ;          9789       ML_CS1 = read;                       !DO A READ TRANSFER
22144 ;          9790       CRC_TSTED = ZERO;
22145 ;          9791       DELAY (ONE_US);
22146 ;          9792
22147 ;          9793       do                                   !TEST ONE CRC GROUP '6 CRC NIBBLES'
22148 ;          9794           begin
22149 ;          9795           PD_TEMP = .ML_PD;                !READ THE PROM DATA FOR THIS ARRAY WORD
22150 ;          9796           DAT_CLK = ONE;                   !CLOCK OUT AN ARRAY WORD INTO THE DATA DIAG REG'S
22151 ;          9797           DELAY (ONE_US);                  !DELAY ONE MICRO SECOND
22152 ;          9798           RD_LNG_WRD;                      !READ THE DATA DIAG REG'S INTO MEMORY
22153 ;          9799
22154 ;          9800           if .PD_TEMP [.CRC_NIB] IS_NOT_SET    !TEST THIS CRC NIBBLE IF GOOD
22155 ;          9801           then
22156 ;          9802               begin
22157 ;          9803               CRC_TSTED = .CRC_TSTED + 1;      !INCREMENT THE GOOD NIBBLE COUNTER
22158 ;          9804               TST_LNG_WRD (.CRC_NIB, .NIB_PAT, ERR_FLG);  !TEST THE CRC NIBBLE
22159 ;          9805
22160 ;          9806               if .ERR_FLG IS_SET               !SEE IF THE TEST FOUND AN ERROR
22161 ;          9807               then
22162 ;          9808                   begin                        !REPORT ERROR IF FLAG IS SET
22163 ;          9809                   CMP_THRESHOLD;               !COMPARE ERROR PRINT THRESHOLD
22164 ;          9810                   ERRDF (131, SYNC, DUMPER);
22165 ;          9811                   PRINTB (FOR_FMT, WRD_64, WRD_24, WRD_73, WRD_10);
22166 ;          9812                   PRINTB (FMT_5, .NIB_PAT, .NIB_SAVE [NIB_9], 8);
22167 ;          9813                   DODU_FLG = ONE;              !SET THE DROP UNIT FLAG
22168 ;          9814                   end;
22169 ;          9815
22170 ;          9816               end;
22171 ;          9817
22172 ;          9818           end
22173 ;          9819       until .CRC_TSTED eql 6;              !REPEAT UNTIL ONE CRC GROUP HAS BEEN TESTED
22174 ;          9820
22175 ;          9821       ENDSUB;                              !END OF SCOPE LOOP
22176 ;          9822       end;
22177 ;          9823
22178 ;          9824   if .DODU_FLG IS_SET
22179 ;          9825   then
22180 ;          9826       begin
22181 ;          9827       DODU (.ML_LUN);
22182 ;          9828       DOCLN;
22183 ;          9829       end;
22184 ;          9830
22185 ;          9831   ENDTST;
```

```
                                                .SBTTL  $T48 TEST CODE SECTION
077674  004167  104712          $T48:   JSR     R1,$SAVE5                       ;
077700  162706  000012                  SUB     #12,SP
077704  005067  115466                  CLR     P.CNT                           ;
077710  012746  000011                  MOV     #11,-(SP)                       ; *,CRC.NIB
077714  005066  000006                  CLR     6(SP)                           ; DODU.FLG
077720  005001                          CLR     R1                              ; LOOP
077722  104402                  1$:     TRAP    2                               ;
077724  152777  000040  115512          BISB    #40,@ML.REG+40                  ;
077732  016705  116074                  MOV     ML.DUT,R5
077736  042705  177770                  BIC     #177770,R5
077742  142777  000007  115474          BICB    #7,@ML.REG+40
077750  150577  115470                  BISB    R5,@ML.REG+40
077754  152777  000001  115542          BISB    #1,@ML.REG+120                  ;
077762  010105                          MOV     R1,R5                           ; LOOP,*
077764  006305                          ASL     R5
077766  066507  077772                  ADD     2$(R5),PC
077772  000012                  2$:     .WORD   3$-2$
077774  000020                          .WORD   4$-2$
077776  000042                          .WORD   5$-2$
100000  000062                          .WORD   6$-2$
100002  000104                          .WORD   7$-2$
100004  012703  000006          3$:     MOV     #6,R3                           ; *,NIB.PAT
100010  000444                          BR      8$                              ;
100012  012777  177777  115534  4$:     MOV     #-1,@ML.REG+150                 ;
100020  012777  177777  115536          MOV     #-1,@ML.REG+160                 ;
100026  012703  000001                  MOV     #1,R3                           ; *,NIB.PAT
100032  000433                          BR      8$                              ;
100034  152777  000077  115512  5$:     BISB    #77,@ML.REG+150                 ;
100042  152777  000077  115514          BISB    #77,@ML.REG+160                 ;
100050  005003                          CLR     R3                              ; NIB.PAT
100052  000423                          BR      8$                              ;
100054  052777  037400  115472  6$:     BIS     #37400,@ML.REG+150              ;
100062  152777  000077  115474          BISB    #77,@ML.REG+160                 ;
100070  012703  000003                  MOV     #3,R3                           ; *,NIB.PAT
100074  000412                          BR      8$                              ;
100076  005066  000002          7$:     CLR     2(SP)                           ; TMP.E1
100102  052766  037477  000002          BIS     #37477,2(SP)                    ; *,TMP.E1
100110  016677  000002  115436          MOV     2(SP),@ML.REG+150               ; TMP.E1,*
100116  012703  000005                  MOV     #5,R3                           ; *,NIB.PAT
100122  004767  120164          8$:     JSR     PC,GD.BLK.XFER                  ;
100126  012777  000061  115250          MOV     #61,@ML.REG                     ;
100134  105777  115314          9$:     TSTB    @ML.REG+50
100140  100375                          BPL     9$
100142  152777  000010  115354          BISB    #10,@ML.REG+120                 ;
100150  004767  120136                  JSR     PC,GD.BLK.XFER                  ;
100154  012777  000071  115222          MOV     #71,@ML.REG                     ;
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

100162  005066  000004                          CLR     4(SP)                   ; CRC.TSTED                                 9790
100166  012704  000001                          MOV     #1,R4                   ; *,$$TMP2                                  9791
100172  001411                          10$:    BEQ     13$
100174  016705  101716                          MOV     L$DLY,R5                ; *,$$TMP1
100200  001404                                  BEQ     12$
100202  005066  000012                  11$:    CLR     12(SP)                  ; $$TMP
100206  005305                                  DEC     R5                      ; $$TMP1
100210  001374                                  BNE     11$
100212  005304                          12$:    DEC     R4                      ; $$TMP2
100214  000766                                  BR      10$
100216  011602                          13$:    MOV     (SP),R2                 ; CRC.NIB,*                                 9800
100220  006202                                  ASR     R2
100222  006202                                  ASR     R2
100224  006202                                  ASR     R2
100226  062702  015342                          ADD     #PD.TEMP,R2
100232  017767  115376  115102          14$:    MOV     @ML.REG+230,PD.TEMP     ;                                           9795
100240  152777  000020  115256                  BISB    #20,@ML.REG+120         ;                                           9796
100246  012704  000001                          MOV     #1,R4                   ; *,$$TMP2                                  9797
100252  001411                          15$:    BEQ     18$
100254  016705  101636                          MOV     L$DLY,R5                ; *,$$TMP1
100260  001404                                  BEQ     17$
100262  005066  000012                  16$:    CLR     12(SP)                  ; $$TMP
100266  005305                                  DEC     R5                      ; $$TMP1
100270  001374                                  BNE     16$
100272  005304                          17$:    DEC     R4                      ; $$TMP2
100274  000766                                  BR      15$
100276  017767  115272  113070          18$:    MOV     @ML.REG+170,D1.TEMP
100304  017767  115274  113064                  MOV     @ML.REG+200,D2.TEMP
100312  017767  115246  113060                  MOV     @ML.REG+160,E2.TEMP
100320  010246                                  MOV     R2,-(SP)                ;                                           9800
100322  016646  000002                          MOV     2(SP),-(SP)             ; CRC.NIB,*
100326  042716  177770                          BIC     #177770,(SP)
100332  012746  000001                          MOV     #1,-(SP)
100336  005046                                  CLR     -(SP)
100340  004767  103270                          JSR     PC,BL$GT2
100344  062706  000010                          ADD     #10,SP
100350  005700                                  TST     R0
100352  001102                                  BNE     21$
100354  005266  000004                          INC     4(SP)                   ; CRC.TSTED                                 9803
100360  011646                                  MOV     (SP),-(SP)              ; CRC.NIB,*                                 9804
100362  010346                                  MOV     R3,-(SP)                ; NIB.PAT,*
100364  012746  000016                          MOV     #16,-(SP)
100370  060616                                  ADD     SP,(SP)                 ; ERR.FLG,*
100372  004767  120000                          JSR     PC,TST.LNG.WRD
100376  026627  000016  000001                  CMP     16(SP),#1               ; ERR.FLG,*                                 9806
100404  001063                                  BNE     20$
100406  005267  114764                          INC     P.CNT                   ;                                           9808
100412  026767  114760  114760                  CMP     P.CNT,LIMIT
100420  003403                                  BLE     19$
100422  062706  000006                          ADD     #6,SP
100426  000460                                  BR      22$
100430  104455                          19$:    TRAP    55                      ;                                           9810
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

100432  000203                                  .WORD   203
100434  012750                                  .WORD   SYNC
100436  026302                                  .WORD   DUMPER
100440  012746  010630                          MOV     #WRD.10,-(SP)                   ;                                       9811
100444  012746  011532                          MOV     #WRD.73,-(SP)
100450  012746  010774                          MOV     #WRD.24,-(SP)
100454  012746  011446                          MOV     #WRD.64,-(SP)
100460  012746  010270                          MOV     #FOR.FMT,-(SP)
100464  012746  000005                          MOV     #5,-(SP)
100470  010600                                  MOV     SP,R0                           ; SP,*
100472  104414                                  TRAP    14
100474  012716  000010                          MOV     #10,(SP)                        ;                                       9812
100500  016705  112674                          MOV     NIB.SAVE+4,R5
100504  006205                                  ASR     R5
100506  006205                                  ASR     R5
100510  006205                                  ASR     R5
100512  006205                                  ASR     R5
100514  000305                                  SWAB    R5
100516  042705  177770                          BIC     #177770,R5
100522  010546                                  MOV     R5,-(SP)
100524  010346                                  MOV     R3,-(SP)                        ; NIB.PAT,*
100526  012746  006650                          MOV     #FMT.5,-(SP)
100532  012746  000004                          MOV     #4,-(SP)
100536  010600                                  MOV     SP,R0                           ; SP,*
100540  104414                                  TRAP    14
100542  012766  000001  000040                  MOV     #1,40(SP)                       ; *,DODU.FLG                            9813
100550  062706  000024                          ADD     #24,SP                          ;                                       9808
100554  062706  000006                  20$:    ADD     #6,SP                           ;                                       9802
100560  026627  000004  000006          21$:    CMP     4(SP),#6                        ; CRC.TSTED,*                           9819
100566  001221                                  BNE     14$
100570  104467                          22$:    TRAP    67
100572  006000                                  ROR     R0
100574  103002                                  BHIS    24$
100576  000167  177120                  23$:    JMP     1$
100602  005201                          24$:    INC     R1                              ; LOOP                                  9723
100604  020127  000004                          CMP     R1,#4                           ; LOOP,*
100610  003772                                  BLE     23$
100612  026627  000006  000001                  CMP     6(SP),#1                        ; DODU.FLG,*                            9824
100620  001004                                  BNE     25$
100622  016700  115202                          MOV     ML.LUN,R0                       ;                                       9827
100626  104451                                  TRAP    51
100630  104444                                  TRAP    44
100632  062706  000014                  25$:    ADD     #14,SP                          ;                                       9676
100636  000207                                  RTS     PC

                                        ; Routine Size:  242 words
                                        ; Maximum stack depth per invocation:  25 words
```

```
 22362
 22363                                          .SBTTL  T48 TEST CODE SECTION
 22367 100640                                   T48::
 22368 100640  004767  177030                   1$:     JSR     PC,$T48                 ;                       9829
 22369 100644  104466                                   TRAP    66
 22370 100646  006000                                   ROR     R0
 22371 100650  103773                                   BLO     1$
 22372 100652  000207                                   RTS     PC
 22373
 22374                                          ; Routine Size:  6 words
 22375                                          ; Maximum stack depth per invocation:  0 words
 22380
 22381
 22382 ;          9832  !<BLF/PAGE>
```

```
22384 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22385 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (101)
22386 ;
22387 ;          9833   !
22388 ;          9834   BGNTST;
22389 ;          9835
22390 ;          9836   !++
22391 ;          9837   ! TEST NUMBER:  TST 49
22392 ;          9838   !
22393 ;          9839   ! TEST NAME:    UNIQUE NIBBLE CRC GENERATION TEST
22394 ;          9840   !
22395 ;          9841   ! TEST DESCRIPTION:
22396 ;          9842   !       TEST CRC CODES GENERATED FOR ONE CRC
22397 ;          9843   !       GROUP (52 UNIQUE UNIBUS NIBBLES) BY:
22398 ;          9844   !
22399 ;          9845   !       1.  DOING MASS BUS WRITE TRANSFERSS WITH THE
22400 ;          9846   !       FIRST IO_BUF CRC GROUP HAVING 51 NIBBLES
22401 ;          9847   !       OF %B'0000' PATTERN AND THE REMAINING NIBBLE
22402 ;          9848   !           WITH PATTERNS OF %B'0000' TO %B'1111'.
22403 ;          9849   !
22404 ;          9850   !       2.  THEN IN DATA DIAGNOSTIC MODE CALCULATE
22405 ;          9851   !           THE CRC CODE FOR THE FIRST CRC
22406 ;          9852   !           GROUP AND COMPARE IT AGAINST THE
22407 ;          9853   !           HARDWARE GENERATED CRC CODE.
22408 ;          9854   !
22409 ;          9855   !       3.  REPEAT PATTERN OF %B'0000' TO %B'1111'
22410 ;          9856   !           FOR EACH OF THE 52 NIBBLES.
22411 ;          9857   !
22412 ;          9858   ! IMPLICIT INPUTS:
22413 ;          9859   !       IO_BUF
22414 ;          9860   !       A  VECTOR OF 256 WORDS WHERE DATA
22415 ;          9861   !       FOR MBUS READS AND WRITES TRANSFERS
22416 ;          9862   !       IS FOUND.
22417 ;          9863   !
22418 ;          9864   !
22419 ;          9865   !--
22420 ;          9866
22421 ;          9867   local
22422 ;          9868       DODU_FLG,                            !DROP UNIT FLAG
22423 ;          9869       TEMP,                                !TEMPORARY STORAGE LOCATION
22424 ;          9870       NIB_SEL;                             !SELECTS 4 BITS 'ONE NIBBLE' FROM THE IO_BUF
22425 ;          9871
22426 ;          9872   DODU_FLG = ZEROES;                       !CLEAR THE DROP UNIT FLAG
22427 ;          9873   CLR_THRESHOLD;                           !CLEAR ERROR PRINT THRESHOLD
22428 ;          9874
22429 ;          9875   incr CNT from 0 to 13 do                 !CLEAR THE FIRST 14 IO_BUF WORDS
22430 ;          9876       IO_BUF [.CNT] = ZEROES;
22431 ;          9877
22432 ;          9878   incr WRD_CNT from 0 to 12 do             !DO THIS TEST ON 13 IO_BUF WORDS
22433 ;          9879       begin
22434 ;          9880       NIB_SEL = -4;                        !RESET THE NIBBLE SELECTOR
22435 ;          9881
22436 ;          9882       incr NIB_TST from 0 to 3 do          !DO THIS TEST ON 4 NIBBLES PER WORD
22437 ;          9883           begin
22438 ;          9884
```

```
22440 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22441 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (101)
22442 ;
22443 ;          9885          if (.WRD_CNT eql 12) and (.NIB_TST eql 2) then exitloop;        !THE LAST 2 NIBBLES ARE NOT TESTED
22444 ;          9886
22445 ;          9887          NIB_SEL = .NIB_SEL + 4;                 !INCREMENT THE NIBBLE SELECTED
22446 ;          9888          TEMP = ZEROES;                          !CLEAR  TEMP LOCATION
22447 ;          9889
22448 ;          9890          incr NIB_PAT from %b'0000' to %b'1111' by %b'0001' do   !RUN PATTERNS ON THEIS NIBBLE
22449 ;          9891              begin
22450 ;          9892              BGNSUB;                             !START OF SCOPE LOOP
22451 ;          9893              TEMP<.NIB_SEL, 4> = .NIB_PAT;       !LOAD PATTERN INTO TEMP AT THIS NIBBLE
22452 ;          9894              IO_BUF [.WRD_CNT] = .TEMP;          !LOAD THE GENERATED PATTERN INTO THE IO_BUF
22453 ;          9895              CLR_MBUS;
22454 ;          9896              GD_BLK_XFER ();                     !SET UP A GOOD BLOCK TRANSFER
22455 ;          9897              ML_CSI = write;                     !DO A WRITE TRANSFER
22456 ;          9898              TIME_OUT_LOOP;                      !WAIT FOR THE TRANSFER TO COMPLETE
22457 ;          9899              A_GEN = ZEROES;                     !CLEAR THE GEN & CAL STORAGE LOCATIONS
22458 ;          9900              B_GEN = ZEROES;
22459 ;          9901              P_GEN = ZEROES;
22460 ;          9902              A_CAL = ZEROES;
22461 ;          9903              B_CAL = ZEROES;
22462 ;          9904              P_CAL = ZEROES;
22463 ;          9905              CAL_CRC ();                         !CALL ROUTINE TO CALCULATE THE CRC CODE FOR THIS PATTERN
22464 ;          9906
22465 ;          9907              if ERR_CHK_CRC ()                   !NOW SEE IF THE GEN CRC IS SAME AS CAL CRC
22466 ;          9908              then
22467 ;          9909                  begin                           !REPORT THE ERROR IF NOT THE SAME
22468 ;          9910                  CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
22469 ;          9911                  ERRDF (132, SYNC, DUMPER);
22470 ;          9912                  PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
22471 ;          9913                  PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
22472 ;          9914                  PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
22473 ;          9915                  DODU_FLG = ONE;
22474 ;          9916                  end;
22475 ;          9917
22476 ;          9918              ENDSUB;                             !END OF SCOPE LOOP
22477 ;          9919              end;
22478 ;          9920
22479 ;          9921          IO_BUF [.WRD_CNT] = ZEROES;             !CLEAR THIS IO_BUF WORD FO NEXT NIBBLE
22480 ;          9922          end;
22481 ;          9923
22482 ;          9924      end;
22483 ;          9925
22484 ;          9926  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF THE DODU FLAG GOT SET
22485 ;          9927  then
22486 ;          9928      begin
22487 ;          9929      DODU (.ML_LUN);
22488 ;          9930      DOCLN;
22489 ;          9931      end;
22490 ;          9932
22491 ;          9933  ENDTST;
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<


                                                .SBTTL  $T49 TEST CODE SECTION
100654  004167  103732          $T49:   JSR     R1,$SAVE5                       ;                                       9831
100660  024646                          CMP     -(SP),-(SP)
100662  005066  000002                  CLR     2(SP)                           ; DODU.FLG                              9872
100666  005067  114504                  CLR     P.CNT
100672  005000                          CLR     R0                              ; CNT                                   9875
100674  010001                  1$:     MOV     R0,R1                           ; CNT,*                                 9876
100676  006301                          ASL     R1
100700  005061  014022                  CLR     IO.BUF(R1)
100704  005200                          INC     R0                              ; CNT                                   9875
100706  020027  000015                  CMP     R0,#15                          ; CNT,*
100712  003770                          BLE     1$
100714  005002                          CLR     R2                              ; WRD.CNT                               9878
100716  012716  177774          2$:     MOV     #-4,(SP)                        ; *,NIB.SEL                             9880
100722  010201                          MOV     R2,R1                           ; WRD.CNT,*                             9894
100724  006301                          ASL     R1
100726  005004                          CLR     R4                              ; NIB.TST                               9882
100730  020227  000014          3$:     CMP     R2,#14                          ; WRD.CNT,*                             9885
100734  001003                          BNE     4$
100736  020427  000002                  CMP     R4,#2                           ; NIB.TST,*
100742  001575                          BEQ     10$
100744  062716  000004          4$:     ADD     #4,(SP)                         ; *,NIB.SEL                             9887
100750  005005                          CLR     R5                              ; TEMP                                  9888
100752  005003                          CLR     R3                              ; NIB.PAT                               9890
100754  104402                  5$:     TRAP    2                               ;                                       9891
100756  010546                          MOV     R5,-(SP)                        ; TEMP,*                                9893
100760  016646  000002                  MOV     2(SP),-(SP)                     ; NIB.SEL,*
100764  012746  000004                  MOV     #4,-(SP)
100770  010346                          MOV     R3,-(SP)                        ; NIB.PAT,*
100772  004767  103000                  JSR     PC,BL$PU1
100776  010005                          MOV     R0,R5                           ; *,TEMP                                9891
101000  010561  014022                  MOV     R5,IO.BUF(R1)                   ; TEMP,*                                9894
101004  152777  000040  114432          BISB    #40,@ML.REG+40
101012  016700  115014                  MOV     ML.DUT,R0
101016  042700  177770                  BIC     #177770,R0
101022  142777  000007  114414          BICB    #7,@ML.REG+40
101030  150077  114410                  BISB    R0,@ML.REG+40
101034  004767  117252                  JSR     PC,GD.BLK.XFER                  ;                                       9896
101040  012777  000061  114336          MOV     #61,@ML.REG                     ;                                       9897
101046  105777  114402          6$:     TSTB    @ML.REG+50
101052  100375                          BPL     6$
101054  005067  114310                  CLR     A.GEN                           ;                                       9899
101060  005067  114306                  CLR     B.GEN                           ;                                       9900
101064  005067  114304                  CLR     P.GEN                           ;                                       9901
101070  005067  114266                  CLR     A.CAL                           ;                                       9902
101074  005067  114264                  CLR     B.CAL                           ;                                       9903
101100  005067  114262                  CLR     P.CAL                           ;                                       9904
101104  004767  115732                  JSR     PC,CAL.CRC                      ;                                       9905
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

101110  004767  116326                          JSR     PC,ERR.CHK.CRC                  ;                                       9907
101114  006000                                  ROR     R0
101116  103066                                  BCC     8$
101120  005267  114252                          INC     P.CNT                           ;                                       9909
101124  026767  114246  114246                  CMP     P.CNT,LIMIT
101132  003403                                  BLE     7$
101134  062706  000010                          ADD     #10,SP
101140  000462                                  BR      9$
101142  104455                          7$:     TRAP    55                              ;                                       9911
101144  000204                                  .WORD   204
101146  012750                                  .WORD   SYNC
101150  026302                                  .WORD   DUMPER
101152  012746  010602                          MOV     #WRD.8,-(SP)                    ;                                       9912
101156  012746  011446                          MOV     #WRD.64,-(SP)
101162  012746  010552                          MOV     #WRD.5,-(SP)
101166  012746  010256                          MOV     #THR.FMT,-(SP)
101172  012746  000004                          MOV     #4,-(SP)
101176  010600                                  MOV     SP,R0                           ; SP,*
101200  104414                                  TRAP    14
101202  016716  114166                          MOV     P.GEN,(SP)                      ;                                       9913
101206  016746  114156                          MOV     A.GEN,-(SP)
101212  016746  114154                          MOV     B.GEN,-(SP)
101216  012746  007632                          MOV     #FMT.19,-(SP)
101222  012746  000004                          MOV     #4,-(SP)
101226  010600                                  MOV     SP,R0                           ; SP,*
101230  104414                                  TRAP    14
101232  016716  114130                          MOV     P.CAL,(SP)                      ;                                       9914
101236  016746  114120                          MOV     A.CAL,-(SP)
101242  016746  114116                          MOV     B.CAL,-(SP)
101246  012746  007702                          MOV     #FMT.20,-(SP)
101252  012746  000004                          MOV     #4,-(SP)
101256  010600                                  MOV     SP,R0                           ; SP,*
101260  104414                                  TRAP    14
101262  012766  000001  000044                  MOV     #1,44(SP)                       ; *,DODU.FLG                            9915
101270  062706  000032                          ADD     #32,SP                          ;                                       9909
101274  062706  000010                  8$:     ADD     #10,SP                          ;                                       9891
101300  104467                                  TRAP    67                              ;                                       9916
101302  006000                                  ROR     R0
101304  103623                                  BLO     5$
101306  005203                          9$:     INC     R3                              ; NIB.PAT                               9890
101310  020327  000017                          CMP     R3,#17                          ; NIB.PAT,*
101314  003617                                  BLE     5$
101316  005061  014022                          CLR     IO.BUF(R1)                      ;                                       9921
101322  005204                                  INC     R4                              ; NIB.TST                               9882
101324  020427  000003                          CMP     R4,#3                           ; NIB.TST,*
101330  003002                                  BGT     10$
101332  000167  177372                          JMP     3$
101336  005202                          10$:    INC     R2                              ; WRD.CNT                               9878
101340  020227  000014                          CMP     R2,#14                          ; WRD.CNT,*
101344  003002                                  BGT     11$
101346  000167  177344                          JMP     2$
101352  026627  000002  000001          11$:    CMP     2(SP),#1                        ; DODU.FLG,*                            9926
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
                                
101360  001004                                  BNE     12$
101362  016700  114442                          MOV     ML.LUN,R0               ;                               9929
101366  104451                                  TRAP    51
101370  104444                                  TRAP    44
101372  022626                          12$:    CMP     (SP)+,(SP)+             ;                               9831
101374  000207                                  RTS     PC

                                        ; Routine Size:  169 words
                                        ; Maximum stack depth per invocation:  25 words


                                        .SBTTL  T49 TEST CODE SECTION
101376                                  T49::
101376  004767  177252                  1$:     JSR     PC,$T49                 ;                               9931
101402  104466                                  TRAP    66
101404  006000                                  ROR     R0
101406  103773                                  BLO     1$
101410  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;       9934    !
;       9935    !<BLF/PAGE>
```

```
22652 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22653 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (102)
22654
22655 ;          9936  !
22656 ;          9937  BGNTST;
22657 ;          9938
22658 ;          9939  !++
22659 ;          9940  ! TEST NUMBER:  TST 50
22660 ;          9941  !
22661 ;          9942  ! TEST NAME:            UNIQUE WORD CRC GENERATION TEST
22662 ;          9943  !
22663 ;          9944  ! TEST DESCRIPTION:
22664 ;          9945  !       TEST CRC CODES GENERATED FOR ONE
22665 ;          9946  !       CRC GROUP (13 UNIBUS WORDS) BY:
22666 ;          9947  !
22667 ;          9948  !       1.  DOING MASS BUS WRITE TRANSFERS
22668 ;          9949  !           USING VARIOUS WORD DATA PATTERENS.
22669 ;          9950  !
22670 ;          9951  !       2.  THEN IN DATA DIAGNOSTIC MODE
22671 ;          9952  !           CALCULATE THE CRC CODE FOR THE
22672 ;          9953  !           FIRST CRC GROUP AND COMPARE IT TO
22673 ;          9954  !           THE HARDWARE GENERATED CRC CODE.
22674 ;          9955  !
22675 ;          9956  ! IMPLICIT INPUTS:
22676 ;          9957  !       IO_BUF
22677 ;          9958  !       A VECTOR OF 256 WORDS WHERE DATA
22678 ;          9959  !       FOR MBUS READS AND WRITES TRANSFERS
22679 ;          9960  !       IS FOUND.
22680 ;          9961  !
22681 ;          9962  !--
22682 ;          9963
22683 ;          9964  local
22684 ;          9965      DODU_FLG,                          !DROP UNIT FLAG
22685 ;          9966      TST_PAT;                           !TEST PATTERN SAVE LOCATION
22686 ;          9967
22687 ;          9968  DODU_FLG = ZEROES;                     !CLEAR THE DROP UNIT FLAG
22688 ;          9969
22689 ;          9970  incr PAT_SEL from 0 to 3 do            !RUN THE TEST ON 4 PATTERNS
22690 ;          9971      begin
22691 ;          9972      BGNSUB;                            !START OF SCOPE LOOP
22692 ;          9973      CLR_MBUS;
22693 ;          9974
22694 ;          9975      case .PAT_SEL from 0 to 3 of       !SELECT ONE OF THE 4 PATTERNS
22695 ;          9976          set
22696 ;          9977
22697 ;          9978          [0] :
22698 ;          9979              TST_PAT = ONES;
22699 ;          9980
22700 ;          9981          [1] :
22701 ;          9982              TST_PAT = %o'052525';
22702 ;          9983
22703 ;          9984          [2] :
22704 ;          9985              TST_PAT = %o'125252';
22705 ;          9986
22706 ;          9987          [3] :
```

```
                                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (102)
22708 ;ML4AD
22709 ;                 TEST CODE SECTION
22710 ;
22711 ;          9988             TST_PAT = %o'070707';
22712 ;          9989         tes;
22713 ;          9990
22714 ;          9991     incr CNT from 0 to 255 do                 !LOAD THE FIRST 13 IO_BUF WORDS WITH TST_PAT
22715 ;          9992         IO_BUF [.CNT] = .TST_PAT;
22716 ;          9993
22717 ;          9994     GD_BLK_XFER ();                           !SET UP A GOOD BLOCK TRANSFER
22718 ;          9995     ML.CS1 = write;                           !DO A WRITE TRANSFER
22719 ;          9996     TIME_OUT_LOOP;                            !WAIT FOR THE TRANSFER TO COMPLETE
22720 ;          9997     A_GEN = ZEROES;                           !CLEAR THE GEN & CAL SAVE LOCATIONS
22721 ;          9998     B_GEN = ZEROES;
22722 ;          9999     P_GEN = ZEROES;
22723 ;          10000    A_CAL = ZEROES;
22724 ;          10001    B_CAL = ZEROES;
22725 ;          10002    P_CAL = ZEROES;
22726 ;          10003    CAL_CRC ();                               !CALCULATE WHAT THE CRC CODE SHOULD BE
22727 ;          10004
22728 ;          10005    if ERR_CHK_CRC ()                         !NOW SEE IF THE GENERATED CRC CODE IS THE SAME
22729 ;          10006    then
22730 ;          10007        begin                                 !REPORT THE ERROR IF NOT THE SAME
22731 ;          10008        ERRDF (133, SYNC, DUMPER);
22732 ;          10009        PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
22733 ;          10010        PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
22734 ;          10011        PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
22735 ;          10012        DODU_FLG = ONE;
22736 ;          10013        end;
22737 ;          10014
22738 ;          10015    ENDSUB;                                   !END OF SCOPE LOOP
22739 ;          10016    end;
22740 ;          10017
22741 ;          10018 if .DODU_FLG IS_SET                          !DROP THIS UNIT IF THE DODU FLAG GOT SET
22742 ;          10019 then
22743 ;          10020     begin
22744 ;          10021     DODU (.ML_LUN);
22745 ;          10022     DOCLN;
22746 ;          10023     end;
22747 ;          10024
22748 ;          10025 ENDTST;
22752
22753                                        .SBTTL  $T50 TEST CODE SECTION                                  9933
22757 101412  004167  103174          $T50:  JSR     R1,$SAVE5                ;                               9968
22758 101416  005005                        CLR     R5                       ; DODU.FLG                      9970
22759 101420  005004                        CLR     R4                       ; PAT.SEL                       9971
22760 101422  104402                  1$:   TRAP    2                        ;                               9972
22761 101424  152777  000040  114012        BISB    #40,@ML.REG+40           ;
22762 101432  016703  114374              MOV     ML.DUT,R3
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

101436  042703  177770                          BIC     #177770,R3
101442  142777  000007  113774                  BICB    #7,@ML.REG+40
101450  150377  113770                          BISB    R3,@ML.REG+40
101454  010403                                  MOV     R4,R3                   ; PAT.SEL,*                     9975
101456  006303                                  ASL     R3
101460  066307  101464                          ADD     2$(R3),PC
101464  000010                          2$:     .WORD   3$-2$
101466  000016                                  .WORD   4$-2$
101470  000024                                  .WORD   5$-2$
101472  000032                                  .WORD   6$-2$
101474  012701  177777                  3$:     MOV     #-1,R1                  ; *,TST.PAT                     9979
101500  000410                                  BR      7$                      ;                               9975
101502  012701  052525                  4$:     MOV     #52525,R1               ; *,TST.PAT                     9982
101506  000405                                  BR      7$                      ;                               9975
101510  012701  125252                  5$:     MOV     #-52526,R1              ; *,TST.PAT                     9985
101514  000402                                  BR      7$                      ;                               9975
101516  012701  070707                  6$:     MOV     #70707,R1               ; *,TST.PAT                     9988
101522  005002                          7$:     CLR     R2                      ; CNT                           9991
101524  010203                          8$:     MOV     R2,R3                   ; CNT,*                         9992
101526  006303                                  ASL     R3
101530  010163  014022                          MOV     R1,IO.BUF(R3)           ; TST.PAT,*
101534  005202                                  INC     R2                      ; CNT                           9991
101536  020227  000377                          CMP     R2,#377                 ; CNT,*
101542  003770                                  BLE     8$
101544  004767  116542                          JSR     PC,GD.BLK.XFER          ;                               9994
101550  012777  000061  113626                  MOV     #61,@ML.REG             ;                               9995
101556  105777  113672                  9$:     TSTB    @ML.REG+50
101562  100375                                  BPL     9$
101564  005067  113600                          CLR     A.GEN                   ;                               9997
101570  005067  113576                          CLR     B.GEN                   ;                               9998
101574  005067  113574                          CLR     P.GEN                   ;                               9999
101600  005067  113556                          CLR     A.CAL                   ;                               1000
101604  005067  113554                          CLR     B.CAL                   ;                               1000
101610  005067  113552                          CLR     P.CAL                   ;                               1000
101614  004767  115222                          JSR     PC,CAL.CRC              ;                               1000
101620  004767  115616                          JSR     PC,ERR.CHK.CRC          ;                               1000
101624  006000                                  ROR     R0
101626  103054                                  BCC     10$
101630  104455                                  TRAP    55                      ;                               1000
101632  000205                                  .WORD   205
101634  012750                                  .WORD   SYNC
101636  026302                                  .WORD   DUMPER
101640  012746  010602                          MOV     #WRD.8,-(SP)            ;                               1000
101644  012746  011446                          MOV     #WRD.64,-(SP)
101650  012746  010552                          MOV     #WRD.5,-(SP)
101654  012746  010256                          MOV     #THR.FMT,-(SP)
101660  012746  000004                          MOV     #4,-(SP)
101664  010600                                  MOV     SP,R0                   ; SP,*
101666  104414                                  TRAP    14
101670  016716  113500                          MOV     P.GEN,(SP)              ;                               1001
101674  016746  113470                          MOV     A.GEN,-(SP)
101700  016746  113466                          MOV     B.GEN,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

101704  012746  007632                          MOV     #FMT.19,-(SP)
101710  012746  000004                          MOV     #4,-(SP)
101714  010600                                  MOV     SP,R0                           ; SP,*
101716  104414                                  TRAP    14
101720  016716  113442                          MOV     P.CAL,(SP)                      ;                                1001
101724  016746  113432                          MOV     A.CAL,-(SP)
101730  016746  113430                          MOV     B.CAL,-(SP)
101734  012746  007702                          MOV     #FMT.20,-(SP)
101740  012746  000004                          MOV     #4,-(SP)
101744  010600                                  MOV     SP,R0                           ; SP,*
101746  104414                                  TRAP    14
101750  012705  000001                          MOV     #1,R5                           ; *,DODU.FLG                     1001
101754  062706  000032                          ADD     #32,SP                          ;                                1000
101760  104467                          10$:    TRAP    67                              ;                                1001
101762  006000                                  ROR     R0
101764  103616                                  BLO     1$
101766  005204                                  INC     R4                              ; PAT.SEL                        9970
101770  020427  000003                          CMP     R4,#3                           ; PAT.SEL,*
101774  003612                                  BLE     1$
101776  005305                                  DEC     R5                              ; DODU.FLG                       1001
102000  001004                                  BNE     11$
102002  016700  114022                          MOV     ML.LUN,R0                       ;                                1002
102006  104451                                  TRAP    51
102010  104444                                  TRAP    44
102012  000207                          11$:    RTS     PC                              ;                                9933

                                        ; Routine Size:  129 words
                                        ; Maximum stack depth per invocation:  19 words



                                                .SBTTL  T50 TEST CODE SECTION
102014                                  T50::
102014  004767  177372                  1$:     JSR     PC,$T50                         ;                                1002
102020  104466                                  TRAP    66
102022  006000                                  ROR     R0
102024  103773                                  BLO     1$
102026  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
22882
22883
22884 ;          10026 !<BLF/PAGE>
```

```
22886 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22887 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)
22888
22889 ;          10027 !
22890 ;          10028 BGNTST;
22891 ;          10029
22892 ;          10030 !++
22893 ;          10031 ! TEST NUMBER:  TST 51
22894 ;          10032 !
22895 ;          10033 ! TEST NAME:            CORRECTABLE ERROR SYNDRONE DECODE TEST
22896 ;          10034 !
22897 ;          10035 ! TEST DESCRIPTION:
22898 ;          10036 !       TEST SYNDRONE DECODE AND ERROR
22899 ;          10037 !       CORRECTION TO DECODE AND CORRECT
22900 ;          10038 !       SINGLE BIT AND MULTIPLE BIT
22901 ;          10039 !       CHANNEL ERRORS BY:
22902 ;          10040 !
22903 ;          10041 !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
22904 ;          10042 !           BITS TO DECODE SINGLE BIT AND
22905 ;          10043 !           MULTIPLE BIT CHANNEL ERRORS.
22906 ;          10044 !
22907 ;          10045 !       2.  THEN DO A MASS BUS READ TRANSFER
22908 ;          10046 !           AND EXAM THE IO_BUF FOR CORRECT
22909 ;          10047 !           BIT COMPLIMENTING.
22910 ;          10048 !
22911 ;          10049 ! IMPLICIT INPUTS:
22912 ;          10050 !       IO_BUF
22913 ;          10051 !       A  VECTOR OF 256 WORDS WHERE DATA
22914 ;          10052 !       FOR MBUS READS AND WRITES TRANSFERS
22915 ;          10053 !       IS FOUND.
22916 ;          10054 !
22917 ;          10055 !
22918 ;          10056 !--
22919 ;          10057
22920 ;          10058 local
22921 ;          10059     BITS_XFERED;                          !POINTS TO THE CHANNEL BEING TESTED
22922 ;          10060
22923 ;          10061 CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
22924 ;          10062 BAI = ONE;                                !BEFORE WE START LETS CLEAR OUT THE ML11'S
22925 ;          10063 IO_BUF = ZEROES;                          !GOOD BLOCK BY WRITTING ZEROES TO IT
22926 ;          10064 GD_BLK_XFER ();
22927 ;          10065 MLCS1 = write;
22928 ;          10066 TIME_OUT_LOOP;
22929 ;          10067 BITS_XFERED = -1;                         !RESET THE CHANNEL POINTER
22930 ;          10068
22931 ;          10069 incr PLOG from 0 to 5 do                  !TEST ONE CRC GROUP '6 ARRAY WORDS'
22932 ;          10070     begin
22933 ;          10071
22934 ;          10072     incr CHANNEL from 0 to 35 do          !TEST 36 BITS IN EACH ARRAY WORD
22935 ;          10073         begin
22936 ;          10074         BGNSUB;                           !START OF SCOPE LOOP
22937 ;          10075         CLR_MBUS;                         !CLEAR THE DRIVE
22938 ;          10076         BITS_XFERED = .BITS_XFERED + 1;   !INCREMENT THE CHANNEL POINTER
22939 ;          10077
22940 ;          10078         incr CNT from 0 to 255 do         !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
```

```
22942 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
22943 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)
22944 ;
22945 ;          10079            IO_BUF [.CNT] = ZEROES;
22946 ;          10080
22947 ;          10081        FORCE_REM (.PLOG, .CHANNEL);          !FORCE THIS BIT IN THIS WORD IN ERROR
22948 ;          10082        GD_BLK_XFER ();                       !SET UP A GOOD BLOCK TRANSFER
22949 ;          10083        ECC_DIS = ZERO;                       !CLEAR ECC DISABLE
22950 ;          10084        MLCS1 = read;                         !DO A READ TRANSFER
22951 ;          10085        TIME_OUT_LOOP;                        !WAIT FOR THE TRANSFER TO COMPLETE
22952 ;          10086
22953 ;          10087        if not FIND_COMP_BIT (.BITS_XFERED)   !SEARCH THE IO_BUF FOR THE COMP BIT
22954 ;          10088        then
22955 ;          10089            begin                             !REPORT AN ERROR IF THIS BIT IS NOT COMP
22956 ;          10090            CMP_THRESHOLD;                    !COMPARE ERROR PRINT THRESHOLD
22957 ;          10091            ERRDF (134, SYNC, DUMPER);
22958 ;          10092            PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
22959 ;          10093            PRINTB (FMT_21, .PLOG, .CHANNEL);
22960 ;          10094            end;
22961 ;          10095
22962 ;          10096        incr WRD_CNT from 0 to 12 do          !SEE IF ANY OTHER BITS GOT COMP'ED
22963 ;          10097
22964 ;          10098            if .IO_BUF [.WRD_CNT] neq ZEROES  !TEST THE IO_BUF FOR ZEROES
22965 ;          10099            then
22966 ;          10100                begin                         !REPORT AN ERROR IF ANY OTHERS ARE SET
22967 ;          10101                CMP_THRESHOLD;                !COMPARE ERROR PRINT THRESHOLD
22968 ;          10102                ERRDF (135, SYNC, DUMPER);
22969 ;          10103                PRINTB (FOR_FMT, WRD_61, WRD_74, WRD_75, PHR_5);
22970 ;          10104                PRINTB (FMT_21, .PLOG, .CHANNEL);
22971 ;          10105                end;
22972 ;          10106
22973 ;          10107        ENDSUB;                               !END OF SCOPE LOOP
22974 ;          10108        end;
22975 ;          10109
22976 ;          10110    end;
22977 ;          10111
22978 ;          10112 BITS_XFERED = -1;                            !RESET THE CHANNEL POINTER
22979 ;          10113
22980 ;          10114 incr CHANNEL from 0 to 35 do                 !TEST 36 CHANNELS FOR MULTIPLE BIT ERRORS
22981 ;          10115    begin
22982 ;          10116    BGNSUB;                                   !START OF SCOPE LOOP
22983 ;          10117    CLR_MBUS;                                 !CLEAR THE DRIVE
22984 ;          10118    BITS_XFERED = .BITS_XFERED + 1;           !INCREMENT THE CHANNEL POINTER
22985 ;          10119
22986 ;          10120    incr CNT from 0 to 20 do                  !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
22987 ;          10121        IO_BUF [.CNT] = ZEROES;
22988 ;          10122
22989 ;          10123    FORCE_REM (58, .CHANNEL);                 !FORCE ALL 6 BITS IN THIS CHANNEL IN ERROR
22990 ;          10124    GD_BLK_XFER ();                           !SET UP A GOOD BLOCK TRANSFER
22991 ;          10125    ECC_DIS = ZERO;                           !CLEAR ECC DISABLE
22992 ;          10126    MLCS1 = read;                             !DO A READ TRANSFER
22993 ;          10127    TIME_OUT_LOOP;                            !WAIT FOR THE TRANSFER TO CMOPLETE
22994 ;          10128
22995 ;          10129    incr BIT_OFFSET from 0 to 180 by 36 do    !SEE IF EVERY 36TH BIT GOT COMP'ED
22996 ;          10130
```

```
 22998 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 22999 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)
 23000
 23001 ;          10131          if not FIND_COMP_BIT (.BITS_XFERED + .BIT_OFFSET)       !SEARCH THE IO_BUF FOR THE COMP'ED BITS
 23002 ;          10132          then
 23003 ;          10133              begin                                               !REPORT AN ERROR IF ANY OF THE BITS ARE NOT COMP'ED
 23004 ;          10134              CMP_THRESHOLD;                                      !COMPARE ERROR PRINT THRESHOLD
 23005 ;          10135              ERRDF (134, SYNC, DUMPER);
 23006 ;          10136              PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
 23007 ;          10137              PRINTB (FMT_21, 58, .CHANNEL);
 23008 ;          10138              end;
 23009 ;          10139
 23010 ;          10140      incr WRD_CNT from 0 to 12 do                                !ALSO SEE IF ANY OTHER BIT GOT COMP'ED
 23011 ;          10141
 23012 ;          10142          if .IO_BUF [.WRD_CNT] neq ZEROES                        !TEST THE IO_BUF FOR ALL ZEROES
 23013 ;          10143          then
 23014 ;          10144              begin                                               !REPORT AN ERROR IF ANY OTHERS ARE COMP'ED
 23015 ;          10145              CMP_THRESHOLD;                                      !COMPARE ERROR PRINT THRESHOLD
 23016 ;          10146              ERRDF (135, SYNC, DUMPER);
 23017 ;          10147              PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
 23018 ;          10148              PRINTB (FMT_21, 58, .CHANNEL);
 23019 ;          10149              end;
 23020 ;          10150
 23021 ;          10151      ENDSUB;                                                     !END OF SCOPE LOOP
 23022 ;          10152      end;
 23023 ;          10153
 23024 ;          10154 ENDTST;
 23028
 23029                                          .SBTTL  $T51 TEST CODE SECTION
 23033 102030  004167  102556          $T51:   JSR     R1,$SAVE5                       ;                                       1002
 23034 102034  005746                          TST     -(SP)
 23035 102036  005067  113334                  CLR     P.CNT                           ;                                       1005
 23036 102042  152777  000010  113374          BISB    #10,@ML.REG+40                  ;                                       1006
 23037 102050  005067  111746                  CLR     IO.BUF                          ;                                       1006
 23038 102054  004767  116232                  JSR     PC,GD.BLK.XFER                  ;                                       1006
 23039 102060  012777  000061  113316          MOV     #61,@ML.REG                     ;                                       1006
 23040 102066  105777  113362          1$:     TSTB    @ML.REG+50
 23041 102072  100375                          BPL     1$
 23042 102074  012716  177777                  MOV     #-1,(SP)                        ; *,BITS.XFERED                         1006
 23043 102100  005005                          CLR     R5                              ; PLOG                                  1006
 23044 102102  005004                  2$:     CLR     R4                              ; CHANNEL                               1007
 23045 102104  104402                  3$:     TRAP    2                               ;                                       1007
 23046 102106  152777  000040  113330          BISB    #40,@ML.REG+40                  ;                                       1007
 23047 102114  016703  113712                  MOV     ML.DUT,R3
 23048 102120  042703  177770                  BIC     #177770,R3
 23049 102124  142777  000007  113312          BICB    #7,@ML.REG+40
 23050 102132  150377  113306                  BISB    R3,@ML.REG+40
 23051 102136  005216                          INC     (SP)                            ; BITS.XFERED                           1007
 23052 102140  005001                          CLR     R1                              ; CNT                                   1007
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

102142  010102                          4$:     MOV     R1,R2                           ; CNT,*                         1007
102144  006302                                  ASL     R2
102146  005062  014022                          CLR     IO.BUF(R2)
102152  005201                                  INC     R1                              ; CNT                           1007
102154  020127  000377                          CMP     R1,#377                         ; CNT,*
102160  003770                                  BLE     4$
102162  010546                                  MOV     R5,-(SP)                        ; PLOG,*                        1008
102164  010446                                  MOV     R4,-(SP)                        ; CHANNEL,*
102166  004767  115640                          JSR     PC,FORCE.REM
102172  004767  116114                          JSR     PC,GD.BLK.XFER                  ;                               1008
102176  142777  000002  113320                  BICB    #2,@ML.REG+120                  ;                               1008
102204  012777  000071  113172                  MOV     #71,@ML.REG                     ;                               1008
102212  105777  113236                  5$:     TSTB    @ML.REG+50
102216  100375                                  BPL     5$
102220  016646  000004                          MOV     4(SP),-(SP)                     ; BITS.XFERED,*                 1008
102224  004767  115430                          JSR     PC,FIND.COMP.BIT
102230  005726                                  TST     (SP)+
102232  006000                                  ROR     R0
102234  103442                                  BLO     7$
102236  005267  113134                          INC     P.CNT                           ;                               1008
102242  026767  113130  113130                  CMP     P.CNT,LIMIT
102250  003402                                  BLE     6$
102252  022626                                  CMP     (SP)+,(SP)+
102254  000512                                  BR      11$
102256  104455                          6$:     TRAP    55                              ;                               1009
102260  000206                                  .WORD   206
102262  012750                                  .WORD   SYNC
102264  026302                                  .WORD   DUMPER
102266  012746  011610                          MOV     #PHR.1,-(SP)                    ;                               1009
102272  012746  011552                          MOV     #WRD.75,-(SP)
102276  012746  011540                          MOV     #WRD.74,-(SP)
102302  012746  010256                          MOV     #THR.FMT,-(SP)
102306  012746  000004                          MOV     #4,-(SP)
102312  010600                                  MOV     SP,R0                           ; SP,*
102314  104414                                  TRAP    14
102316  010416                                  MOV     R4,(SP)                         ; CHANNEL,*                     1009
102320  010546                                  MOV     R5,-(SP)                        ; PLOG,*
102322  012746  007754                          MOV     #FMT.21,-(SP)
102326  012746  000003                          MOV     #3,-(SP)
102332  010600                                  MOV     SP,R0                           ; SP,*
102334  104414                                  TRAP    14
102336  062706  000020                          ADD     #20,SP                          ;                               1008
102342  005003                          7$:     CLR     R3                              ; WRD.CNT                       1009
102344  010302                          8$:     MOV     R3,R2                           ; WRD.CNT,*                     1009
102346  006302                                  ASL     R2
102350  005762  014022                          TST     IO.BUF(R2)
102354  001442                                  BEQ     9$
102356  005267  113014                          INC     P.CNT                           ;                               1010
102362  026767  113010  113010                  CMP     P.CNT,LIMIT
102370  003040                                  BGT     10$
102372  104455                                  TRAP    55                              ;                               1010
102374  000207                                  .WORD   207
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

102376  012750                                  .WORD   SYNC
102400  026302                                  .WORD   DUMPER
102402  012746  011714                          MOV     #PHR.5,-(SP)                    ;                                1010
102406  012746  011552                          MOV     #WRD.75,-(SP)
102412  012746  011540                          MOV     #WRD.74,-(SP)
102416  012746  011416                          MOV     #WRD.61,-(SP)
102422  012746  010270                          MOV     #FOR.FMT,-(SP)
102426  012746  000005                          MOV     #5,-(SP)
102432  010600                                  MOV     SP,R0                           ; SP,*
102434  104414                                  TRAP    14
102436  010416                                  MOV     R4,(SP)                         ; CHANNEL,*                      1010
102440  010546                                  MOV     R5,-(SP)                        ; PLOG,*
102442  012746  007754                          MOV     #FMT.21,-(SP)
102446  012746  000003                          MOV     #3,-(SP)
102452  010600                                  MOV     SP,R0                           ; SP,*
102454  104414                                  TRAP    14
102456  062706  000022                          ADD     #22,SP                          ;                                1010
102462  005203                          9$:     INC     R3                              ; WRD.CNT                        1009
102464  020327  000014                          CMP     R3,#14                          ; WRD.CNT,*
102470  003725                                  BLE     8$
102472  022626                          10$:    CMP     (SP)+,(SP)+                     ;                                1007
102474  104467                                  TRAP    67                              ;                                1010
102476  006000                                  ROR     R0
102500  103601                                  BLO     3$
102502  005204                          11$:    INC     R4                              ; CHANNEL                        1007
102504  020427  000043                          CMP     R4,#43                          ; CHANNEL,*
102510  003002                                  BGT     12$
102512  000167  177366                          JMP     3$
102516  005205                          12$:    INC     R5                              ; PLOG                           1006
102520  020527  000005                          CMP     R5,#5                           ; PLOG,*
102524  003002                                  BGT     13$
102526  000167  177350                          JMP     2$
102532  012716  177777                  13$:    MOV     #-1,(SP)                        ; *,BITS.XFERED                  1011
102536  005003                                  CLR     R3                              ; CHANNEL                        1011
102540  104402                          14$:    TRAP    2                               ;                                1011
102542  152777  000040  112674                  BISB    #40,@ML.REG+40                  ;                                1011
102550  016705  113256                          MOV     ML.DUT,R5
102554  042705  177770                          BIC     #177770,R5
102560  142777  000007  112656                  BICB    #7,@ML.REG+40
102566  150577  112652                          BISB    R5,@ML.REG+40
102572  005216                                  INC     (SP)                            ; BITS.XFERED                    1011
102574  005001                                  CLR     R1                              ; CNT                            1012
102576  010102                          15$:    MOV     R1,R2                           ; CNT,*                          1012
102600  006302                                  ASL     R2
102602  005062  014022                          CLR     IO.BUF(R2)
102606  005201                                  INC     R1                              ; CNT                            1012
102610  020127  000024                          CMP     R1,#24                          ; CNT,*
102614  003770                                  BLE     15$
102616  012746  000072                          MOV     #72,-(SP)                       ;                                1012
102622  010346                                  MOV     R3,-(SP)                        ; CHANNEL,*
102624  004767  115202                          JSR     PC,FORCE.REM
102630  004767  115456                          JSR     PC,GD.BLK.XFER                  ;                                1012
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

102634  142777  000002  112662                  BICB    #2,@ML.REG+120                  ;                                       1012
102642  012777  000071  112534                  MOV     #71,@ML.REG                     ;                                       1012
102650  105777  112600                  16$:    TSTB    @ML.REG+50
102654  100375                                  BPL     16$
102656  005002                                  CLR     R2                              ; BIT.OFFSET                            1012
102660  010246                          17$:    MOV     R2,-(SP)                        ; BIT.OFFSET,*                          1013
102662  066616  000006                          ADD     6(SP),(SP)                      ; BITS.XFERED,*
102666  004767  114766                          JSR     PC,FIND.COMP.BIT
102672  005726                                  TST     (SP)+
102674  006000                                  ROR     R0
102676  103441                                  BLO     18$
102700  005267  112472                          INC     P.CNT                           ;                                       1013
102704  026767  112466  112466                  CMP     P.CNT,LIMIT
102712  003040                                  BGT     19$
102714  104455                                  TRAP    55                              ;                                       1013
102716  000206                                  .WORD   206
102720  012750                                  .WORD   SYNC
102722  026302                                  .WORD   DUMPER
102724  012746  011610                          MOV     #PHR.1,-(SP)                    ;                                       1013
102730  012746  011552                          MOV     #WRD.75,-(SP)
102734  012746  011540                          MOV     #WRD.74,-(SP)
102740  012746  010256                          MOV     #THR.FMT,-(SP)
102744  012746  000004                          MOV     #4,-(SP)
102750  010600                                  MOV     SP,R0                           ; SP,*
102752  104414                                  TRAP    14
102754  010316                                  MOV     R3,(SP)                         ; CHANNEL,*                             1013
102756  012746  000072                          MOV     #72,-(SP)
102762  012746  007754                          MOV     #FMT.21,-(SP)
102766  012746  000003                          MOV     #3,-(SP)
102772  010600                                  MOV     SP,R0                           ; SP,*
102774  104414                                  TRAP    14
102776  062706  000020                          ADD     #20,SP                          ;                                       1013
103002  062702  000044                  18$:    ADD     #44,R2                          ; *,BIT.OFFSET                          1012
103006  020227  000264                          CMP     R2,#264                         ; BIT.OFFSET,*
103012  003722                                  BLE     17$
103014  005001                          19$:    CLR     R1                              ; WRD.CNT                               1014
103016  010102                          20$:    MOV     R1,R2                           ; WRD.CNT,*                             1014
103020  006302                                  ASL     R2
103022  005762  014022                          TST     IO.BUF(R2)
103026  001445                                  BEQ     21$
103030  005267  112342                          INC     P.CNT                           ;                                       1014
103034  026767  112336  112336                  CMP     P.CNT,LIMIT
103042  003043                                  BGT     22$
103044  104455                                  TRAP    55                              ;                                       1014
103046  000207                                  .WORD   207
103050  012750                                  .WORD   SYNC
103052  026302                                  .WORD   DUMPER
103054  012746  011462                          MOV     #WRD.67,-(SP)                   ;                                       1014
103060  012746  010650                          MOV     #WRD.12,-(SP)
103064  012746  011552                          MOV     #WRD.75,-(SP)
103070  012746  011540                          MOV     #WRD.74,-(SP)
103074  012746  011416                          MOV     #WRD.61,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

103100  012746  010304                          MOV     #FIV.FMT,-(SP)
103104  012746  000006                          MOV     #6,-(SP)
103110  010600                                  MOV     SP,R0                           ; SP,*
103112  104414                                  TRAP    14
103114  010316                                  MOV     R3,(SP)                         ; CHANNEL,*                     1014
103116  012746  000072                          MOV     #72,-(SP)
103122  012746  007754                          MOV     #FMT.21,-(SP)
103126  012746  000003                          MOV     #3,-(SP)
103132  010600                                  MOV     SP,R0                           ; SP,*
103134  104414                                  TRAP    14
103136  062706  000024                          ADD     #24,SP                          ;                               1014
103142  005201                          21$:    INC     R1                              ; WRD.CNT                       1014
103144  020127  000014                          CMP     R1,#14                          ; WRD.CNT,*
103150  003722                                  BLE     20$
103152  022626                          22$:    CMP     (SP)+,(SP)+                     ;                               1011
103154  104467                                  TRAP    67                              ;                               1014
103156  006000                                  ROR     R0
103160  103002                                  BHIS    24$
103162  000167  177352                  23$:    JMP     14$
103166  005203                          24$:    INC     R3                              ; CHANNEL                       1011
103170  020327  000043                          CMP     R3,#43                          ; CHANNEL,*
103174  003772                                  BLE     23$
103176  005726                                  TST     (SP)+                           ;                               1002
103200  000207                                  RTS     PC

                                        ; Routine Size:  309 words
                                        ; Maximum stack depth per invocation:  19 words



                                                .SBTTL  T51 TEST CODE SECTION
103202                                  T51::
103202  004767  176622                  1$:     JSR     PC,$T51                         ;                               1015
103206  104466                                  TRAP    66
103210  006000                                  ROR     R0
103212  103773                                  BLO     1$
103214  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
23283
23284
23285 ;          10155 !<BLF/PAGE>
```

```
23287 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
23288 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (104)
23289 ;
23290 ;          10156 !
23291 ;          10157 BGNTST;
23292 ;          10158
23293 ;          10159 !++
23294 ;          10160 ! TEST NUMBER:  TST 52
23295 ;          10161 !
23296 ;          10162 ! TEST NAME:            UNCORRECTABLE ERROR SYNDRONE DECODE TEST AT CHANNELS > 35
23297 ;          10163 !
23298 ;          10164 ! TEST DESCRIPTION:
23299 ;          10165 !       TEST SYNDRONE DECODE TO DETECT BUT
23300 ;          10166 !       NOT CORRECT UNCORRECTABLE CHANNEL
23301 ;          10167 !       ERRORS BY:
23302 ;          10168 !
23303 ;          10169 !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
23304 ;          10170 !           BITS TO INDICATE CHANNEL ERRORS
23305 ;          10171 !           AT WORDS OF A CRC GROUP BUT AT CHANNELS
23306 ;          10172 !           GREATER THAN 35.
23307 ;          10173 !
23308 ;          10174 !       2.  DO A MASS BUS READ TRANSFER
23309 ;          10175 !
23310 ;          10176 !       3.  THEN EXAMIN THE IO_BUF FOR NO
23311 ;          10177 !           BITS COMPLIMENTED AND ECH  AND
23312 ;          10178 !           BITS SET
23313 ;          10179 !
23314 ;          10180 ! IMPLICIT INPUTS:
23315 ;          10181 !       IO_BUF
23316 ;          10182 !       A VECTOR OF 256 WORDS WHERE DATA
23317 ;          10183 !       FOR MBUS READS AND WRITES TRANSFERS
23318 ;          10184 !       IS FOUND.
23319 ;          10185 !
23320 ;          10186 !
23321 ;          10187 !--
23322 ;          10188
23323 ;          10189 local
23324 ;          10190     PLOG;                                 !INDEX INTO REMAINDER TABLE 'REM_TBL'
23325 ;          10191
23326 ;          10192 CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
23327 ;          10193 BAI = ONE;                                !FIRST LETS CLEAR THE ML11'S GOOD BLOCK
23328 ;          10194 IO_BUF = ZEROES;                          !BY WRITING ZEROES TO IT
23329 ;          10195 GO_BLK_XFER ();
23330 ;          10196 MLCS1 = write;
23331 ;          10197 TIME_OUT_LOOP;
23332 ;          10198
23333 ;          10199 incr PLOG_SEL from 0 to 6 do              !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
23334 ;          10200     begin
23335 ;          10201
23336 ;          10202     case .PLOG_SEL from 0 to 6 of         !SELECT A PLOG VALUE
23337 ;          10203         set
23338 ;          10204
23339 ;          10205         [0] :                             !POINTS TO WORD 0 IN THE CRC GROUP
23340 ;          10206             PLOG = 0;
23341 ;          10207
```

```
23343 ;ML4AD
23344 ;                 TEST CODE SECTION
23345 ;
23346 ;          10208          [1] :                          !POINTS TO WORD 1 IN THE CRC GROUP
23347 ;          10209              PLOG = 1;
23348 ;          10210
23349 ;          10211          [2] :                          !POINTS TO WORD 2 IN THE CRC GROUP
23350 ;          10212              PLOG = 2;
23351 ;          10213
23352 ;          10214          [3] :                          !POINTS TO WORD 3 IN THE CRC GROUP
23353 ;          10215              PLOG = 3;
23354 ;          10216
23355 ;          10217          [4] :                          !POINTS TO WORD 4 IN THE CRC GROUP
23356 ;          10218              PLOG = 4;
23357 ;          10219
23358 ;          10220          [5] :                          !POINTS TO WORD 5 IN THE CRC GROUP
23359 ;          10221              PLOG = 5;
23360 ;          10222
23361 ;          10223          [6] :                          !POINTS TO ALL 6 WORDS IN THE CRC GROUP
23362 ;          10224              PLOG = 58;
23363 ;          10225          tes;
23364 ;          10226
23365 ;          10227      incr CHANNEL from 36 to 62 do      !TEST AT CHANNELS > 35 TO FORCE UNCORRECTABLE ERROR
23366 ;          10228          begin
23367 ;          10229          BGNSUB;                        !START OF SCOPE LOOP
23368 ;          10230          CLR_MBUS;                      !CLEAR THE DRIVE
23369 ;          10231
23370 ;          10232          incr COUNT from 0 to 255 do    !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
23371 ;          10233              IO_BUF [.COUNT] = ZEROES;
23372 ;          10234
23373 ;          10235          FORCE_REM (.PLOG, .CHANNEL);   !FORCE UNCORRECTABLE ERROR AT THIS WORD AND CHANNEL
23374 ;          10236          GD_BLK_XFER ();                !SET UP A GOOD BLOCK TRANSFER
23375 ;          10237          ECC_DIS = ZERO;                !CLEAR ECC DISABLE
23376 ;          10238          MLCS1 = read;                  !DO A READ TRANSFER
23377 ;          10239          TIME_OUT_LOOP;                 !WAIT FOR THE  TRANSFER TO COMPLETE
23378 ;          10240
23379 ;          10241          if not ((.ECH_ERR) and (.UNC_ERR))   !SEE IF THE ERROR WAS DETECTED
23380 ;          10242          then
23381 ;          10243              begin                      !ERROR IF NOT DECTECTED
23382 ;          10244              CMP_THRESHOLD;             !COMPARE ERROR PRINT THRESHOLD
23383 ;          10245              ERRDF (136, SYNC, DUMPER);
23384 ;          10246              PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_76, WRD_9);
23385 ;          10247              PRINTB (FMT_21, .PLOG, .CHANNEL);
23386 ;          10248              end;
23387 ;          10249
23388 ;          10250          incr CNT from 0 to 12 do       !SEE IF ANY CORRECTION WAS DONE
23389 ;          10251
23390 ;          10252              if .IO_BUF [.CNT] neq ZEROES   !SEARCH THE IO_BUF FOR ALL ZEROES
23391 ;          10253              then
23392 ;          10254                  begin                  !REPORT AN ERROR IF ANY CORRECTION WAS DONE
23393 ;          10255                  CMP_THRESHOLD;         !COMPARE ERROR PRINT THRESHOLD
23394 ;          10256                  ERRDF (137, SYNC, DUMPER);
23395 ;          10257                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
23396 ;          10258                  PRINTB (FMT_21, .PLOG, .CHANNEL);
23397 ;          10259                  end;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (104)

;          10260
;          10261          ENDSUB;                                !END OF SCOPE LOOP
;          10262          end;
;          10263
;          10264      end;
;          10265
;          10266 ENDTST;

                                        .SBTTL  $T52 TEST CODE SECTION
103216  004167  101370          $T52:   JSR     R1,$SAVE5                       ;                                1015
103222  005067  112150                  CLR     P.CNT                           ;                                1019
103226  152777  000010  112210          BISB    #10,@ML.REG+40                  ;                                1019
103234  005067  110562                  CLR     IO.BUF                          ;                                1019
103240  004767  115046                  JSR     PC,GD.BLK.XFER                  ;                                1019
103244  012777  000061  112132          MOV     #61,@ML.REG                     ;                                1019
103252  105777  112176          1$:     TSTB    @ML.REG+50
103256  100375                          BPL     1$
103260  005005                          CLR     R5                              ; PLOG.SEL                       1019
103262  010504                  2$:     MOV     R5,R4                           ; PLOG.SEL,*                     1020
103264  006304                          ASL     R4
103266  066407  103272                  ADD     3$(R4),PC
103272  000016                  3$:     .WORD   4$-3$
103274  000022                          .WORD   5$-3$
103276  000030                          .WORD   6$-3$
103300  000036                          .WORD   7$-3$
103302  000044                          .WORD   8$-3$
103304  000052                          .WORD   9$-3$
103306  000060                          .WORD   10$-3$
103310  005003                  4$:     CLR     R3                              ; PLOG                           1020
103312  000421                          BR      11$                             ;                                1020
103314  012703  000001          5$:     MOV     #1,R3                           ; *,PLOG                         1020
103320  000416                          BR      11$                             ;                                1020
103322  012703  000002          6$:     MOV     #2,R3                           ; *,PLOG                         1021
103326  000413                          BR      11$                             ;                                1020
103330  012703  000003          7$:     MOV     #3,R3                           ; *,PLOG                         1021
103334  000410                          BR      11$                             ;                                1020
103336  012703  000004          8$:     MOV     #4,R3                           ; *,PLOG                         1021
103342  000405                          BR      11$                             ;                                1020
103344  012703  000005          9$:     MOV     #5,R3                           ; *,PLOG                         1022
103350  000402                          BR      11$                             ;                                1020
103352  012703  000072          10$:    MOV     #72,R3                          ; *,PLOG                         1022
103356  012704  000044          11$:    MOV     #44,R4                          ; *,CHANNEL                      1022
103362  104402                  12$:    TRAP    2                               ;                                1022
103364  152777  000040  112052          BISB    #40,@ML.REG+40                  ;                                1022
103372  016702  112434                  MOV     ML.DUT,R2
103376  042702  177770                  BIC     #177770,R2
```

```
23455                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
23456                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
23457
23458 103402  142777  000007  112034            BICB    #7,@ML.REG+40
23459 103410  150277  112030                    BISB    R2,@ML.REG+40
23460 103414  005001                            CLR     R1                      ; COUNT                 1023
23461 103416  010102                    13$:    MOV     R1,R2                   ; COUNT,*               1023
23462 103420  006302                            ASL     R2
23463 103422  005062  014022                    CLR     IO.BUF(R2)
23464 103426  005201                            INC     R1                      ; COUNT                 1023
23465 103430  020127  000377                    CMP     R1,#377                 ; COUNT,*
23466 103434  003770                            BLE     13$
23467 103436  010346                            MOV     R3,-(SP)                ; PLOG,*                1023
23468 103440  010446                            MOV     R4,-(SP)                ; CHANNEL,*
23469 103442  004767  114364                    JSR     PC,FORCE.REM
23470 103446  004767  114640                    JSR     PC,GD.BLK.XFER          ;                       1023
23471 103452  142777  000002  112044            BICB    #2,@ML.REG+120          ;                       1023
23472 103460  012777  000071  111716            MOV     #71,@ML.REG             ;                       1023
23473 103466  105777  111762            14$:    TSTB    @ML.REG+50
23474 103472  100375                            BPL     14$
23475 103474  132777  000100  111762            BITB    #100,@ML.REG+60         ;                       1024
23476 103502  001403                            BEQ     15$
23477 103504  005777  112104                    TST     @ML.REG+210
23478 103510  100444                            BMI     17$
23479 103512  005267  111660            15$:    INC     P.CNT                   ;                       1024
23480 103516  026767  111654  111654            CMP     P.CNT,LIMIT
23481 103524  003402                            BLE     16$
23482 103526  022626                            CMP     (SP)+,(SP)+
23483 103530  000520                            BR      22$
23484 103532  104455                    16$:    TRAP    55                      ;                       1024
23485 103534  000210                            .WORD   210
23486 103536  012750                            .WORD   SYNC
23487 103540  026302                            .WORD   DUMPER
23488 103542  012746  010616                    MOV     #WRD.9,-(SP)            ;                       1024
23489 103546  012746  011562                    MOV     #WRD.76,-(SP)
23490 103552  012746  010630                    MOV     #WRD.10,-(SP)
23491 103556  012746  011462                    MOV     #WRD.67,-(SP)
23492 103562  012746  010270                    MOV     #FOR.FMT,-(SP)
23493 103566  012746  000005                    MOV     #5,-(SP)
23494 103572  010600                            MOV     SP,R0                   ; SP,*
23495 103574  104414                            TRAP    14
23496 103576  010416                            MOV     R4,(SP)                 ; CHANNEL,*             1024
23497 103600  010346                            MOV     R3,-(SP)                ; PLOG,*
23498 103602  012746  007754                    MOV     #FMT.21,-(SP)
23499 103606  012746  000003                    MOV     #3,-(SP)
23500 103612  010600                            MOV     SP,R0                   ; SP,*
23501 103614  104414                            TRAP    14
23502 103616  062706  000022                    ADD     #22,SP                  ;                       1024
23503 103622  005001                    17$:    CLR     R1                      ; CNT                   1025
23504 103624  010102                    18$:    MOV     R1,R2                   ; CNT,*                 1025
23505 103626  006302                            ASL     R2
23506 103630  005762  014022                    TST     IO.BUF(R2)
23507 103634  001,44                            BEQ     19$
23508 103636  005267  111534                    INC     P.CNT                   ;                       1025
23509 103642  026767  111530  111530            CMP     P.CNT,LIMIT
```

```
23511                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
23512                                   ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
23513
23514 103650  003042                            BGT     20$
23515 103652  104455                            TRAP    55                      ;                               1025
23516 103654  000211                            .WORD   211
23517 103656  012750                            .WORD   SYNC
23518 103660  026302                            .WORD   DUMPER
23519 103662  012746  011462                    MOV     #WRD.67,-(SP)           ;                               1025
23520 103666  012746  010650                    MOV     #WRD.12,-(SP)
23521 103672  012746  011552                    MOV     #WRD.75,-(SP)
23522 103676  012746  011540                    MOV     #WRD.74,-(SP)
23523 103702  012746  011416                    MOV     #WRD.61,-(SP)
23524 103706  012746  010304                    MOV     #FIV.FMT,-(SP)
23525 103712  012746  000006                    MOV     #6,-(SP)
23526 103716  010600                            MOV     SP,R0                   ; SP,*
23527 103720  104414                            TRAP    14
23528 103722  010416                            MOV     R4,(SP)                 ; CHANNEL,*                     1025
23529 103724  010346                            MOV     R3,-(SP)                ; PLOG,*
23530 103726  012746  007754                    MOV     #FMT.21,-(SP)
23531 103732  012746  000003                    MOV     #3,-(SP)
23532 103736  010600                            MOV     SP,R0                   ; SP,*
23533 103740  104414                            TRAP    14
23534 103742  062706  000024                    ADD     #24,SP                  ;                               1025
23535 103746  005201                    19$:    INC     R1                      ; CNT                           1025
23536 103750  020127  000014                    CMP     R1,#14                  ; CNT,*
23537 103754  003723                            BLE     18$
23538 103756  022626                    20$:    CMP     (SP)+,(SP)+             ;                               1022
23539 103760  104467                            TRAP    67                      ;                               1025
23540 103762  006000                            ROR     R0
23541 103764  103002                            BHIS    22$
23542 103766  000167  177370            21$:    JMP     12$
23543 103772  005204                    22$:    INC     R4                      ; CHANNEL                       1022
23544 103774  020427  000076                    CMP     R4,#76                  ; CHANNEL,*
23545 104000  003772                            BLE     21$
23546 104002  005205                            INC     R5                      ; PLOG.SEL                      1019
23547 104004  020527  000006                    CMP     R5,#6                   ; PLOG.SEL,*
23548 104010  003002                            BGT     23$
23549 104012  000167  177244                    JMP     2$
23550 104016  000207                    23$:    RTS     PC                      ;                               1015
23551
23552                                   ; Routine Size:  193 words
23553                                   ; Maximum stack depth per invocation:  18 words
23558
23559
23563
23564                                           .SBTTL  T52 TEST CODE SECTION
```

SEQ 0487

```
 23572 104020                           T52::
 23573 104020  004767  177172          1$:     JSR     PC,$T52                 ;                1026
 23574 104024  104466                          TRAP    66
 23575 104026  006000                          ROR     R0
 23576 104030  103773                          BLO     1$
 23577 104032  000207                          RTS     PC
 23578
 23579                                  ; Routine Size:  6 words
 23580                                  ; Maximum stack depth per invocation:  0 words
 23585
 23586
 23587 ;          10267 !<BLF/PAGE>
```

```
;ML4AD
;                    TEST CODE SECTION

                10268 !
                10269 BGNTST;
                10270
                10271 !++
                10272 ! TEST NUMBER:  TST 53
                10273 !
                10274 ! TEST NAME:              MULTIPLE CHANNEL ERROR SYNDRONE DECODE TEST
                10275 !
                10276 ! TEST DESCRIPTION:
                10277 !       TEST SYNDRONE DECODE TO DETECT BUT NOT
                10278 !       CORRECT UNCORRECTABLE MULTIPLE CHANNEL
                10279 !       ERRORS BY:
                10280 !
                10281 !       1.  VIA ECC DIAGNOSTIC MODE FORCE SYNDRONE
                10282 !           BITS TO INDICATE MULTIPLE CHANNEL ERRORS
                10283 !           BY ASSIGNING CRC_A EQUAL TO CRC_B
                10284 !
                10285 !       2.  DO A MASS BUS READ TRANSFER
                10286 !
                10287 !       3.  THEN EXAMIN THE IO_BUF FOR  NO BITS
                10288 !           COMPLIMENTED AND ECH AND UNC BITS SET
                10289 !
                10290 ! IMPLICIT INPUTS:
                10291 !       IO_BUF
                10292 !       A  VECTOR OF 256 WORDS WHERE DATA
                10293 !       FOR MBUS READS AND WRITES TRANSFERS
                10294 !       IS FOUND.
                10295 !
                10296 !
                10297 !--
                10298
                10299 local
                10300     PLOG;                                 !INDEX INTO REMAINDER TABLE 'REM_TBL'
                10301
                10302 CLR_THRESHOLD;                           !CLEAR ERROR PRINT THRESHOLD
                10303 BAI = ONE;                               !FIRST LETS CLEAR THE ML11'S GOOD
                10304 IO_BUF = ZEROES;                        !BLOCK BY WRITING ZEROES TO IT
                10305 GO_BLK_XFER ();
                10306 ML[S1 = write;
                10307 TIME_OUT_LOOP;
                10308
                10309 incr PLOG_SEL from 0 to 6 do            !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
                10310     begin
                10311
                10312     case .PLOG_SEL from 0 to 6 of       !SELECT A PLOG VALUE
                10313         set
                10314
                10315         [0] :                           !POINTS TO CRC WORD 0
                10316             PLOG = 0;
                10317
                10318         [1] :                           !POINTS TO CRC WORD 1
                10319             PLOG = 1;
```

```
23645 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
23646 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (105)
23647 ;
23648 ;          10320
23649 ;          10321          [2] :                            !POINTS TO CRC WORD 2
23650 ;          10322              PLOG = 2;
23651 ;          10323
23652 ;          10324          [3] :                            !POINTS TO CRC WORD 3
23653 ;          10325              PLOG = 3;
23654 ;          10326
23655 ;          10327          [4] :                            !POINTS TO CRC WORD 4
23656 ;          10328              PLOG = 4;
23657 ;          10329
23658 ;          10330          [5] :                            !POINTS TO CRC WORD 5
23659 ;          10331              PLOG = 5;
23660 ;          10332
23661 ;          10333          [6] :                            !POINTS TO ALL 6 WORDS IN CRC GROUP
23662 ;          10334              PLOG = 58;
23663 ;          10335          tes;
23664 ;          10336
23665 ;          10337      incr CHANNEL from 1 to 35 do         !TEST 35 CHANNELS STARTING AT CHANNEL 1
23666 ;          10338          begin
23667 ;          10339          AGNSUB;                          !START OF SCOPE LOOP
23668 ;          10340          CLR_BUS;                         !CLEAR THE DRIVE
23669 ;          10341
23670 ;          10342          incr COUNT from 0 to 255 do      !CLEAR FIRST CRC GROUP IN THE IO_BUF
23671 ;          10343              IO_BUF [.COUNT] = ZEROES;
23672 ;          10344
23673 ;          10345          FORCE_REM (.PLOG, .CHANNEL);     !FORCE ERR AT THIS WORD AND CHANNEL
23674 ;          10346          CRC_A = .CRC_B;                  !CRC_A EQL TO CRC_B CAUSES THE UNC ERROR
23675 ;          10347          GD_BLK_XFER ();                  !SET UP A GOOD BLOCK TRANSFER
23676 ;          10348          ECC_DIS = ZERO;                  !CLEAR ECC DISABLE
23677 ;          10349          MLCS1 = read;                    !DO A READ TRANSFER
23678 ;          10350          TIME_OUT_LOOP;                   !WAIR UNTIL THE TRANSFER IS COMPLETE
23679 ;          10351
23680 ;          10352          if not ((.ECH_ERR) and (.UNC_ERR))   !SEE IF THE ERROR WAS DETECTED
23681 ;          10353          then
23682 ;          10354              begin                        !REPORT ERROR IF NOT DETECTED
23683 ;          10355              CMP_THRESHOLD;               !COMPARE ERROR PRINT THRESHOLD
23684 ;          10356              ERRDF (138, SYNC, DUMPER);
23685 ;          10357              PRINTB (FOR_FMT, WRD_77, WRD_10, WRD_76, WRD_9);
23686 ;          10358              PRINTB (FMT_21, .PLOG, .CHANNEL);
23687 ;          10359              end;
23688 ;          10360
23689 ;          10361          incr CNT from 0 to 12 do         !SEE IF ANY ERROR CORRECTION WAS DONE
23690 ;          10362
23691 ;          10363              if .IO_BUF [.CNT] neq ZEROES !TEST THE IO_BUF FOR ALL ZEROES
23692 ;          10364              then
23693 ;          10365                  begin                    !ERROR IF ANY BITS GOT FLIPPED
23694 ;          10366                  CMP_THRESHOLD;           !COMPARE ERROR PRINT THRESHOLD
23695 ;          10367                  ERRDF (139, SYNC, DUMPER);
23696 ;          10368                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
23697 ;          10369                  PRINTB (FMT_21, .PLOG, .CHANNEL);
23698 ;          10370                  end;
23699 ;          10371
```

```
23701 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
23702 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (105)
23703
23704 ;         10372           ENDSUB;                         !END OF SCOPE LOOP
23705 ;         10373           end;
23706 ;         10374
23707 ;         10375       end;
23708 ;         10376
23709 ;         10377 ENDTST;
23713
23714                                           .SBTTL  $T53 TEST CODE SECTION                                          1026
23718 104034  004167  100552          $T53:    JSR     R1,$SAVE5                       ;                               1030
23719 104040  005067  111332                   CLR     P.CNT                           ;                               1030
23720 104044  152777  000010  111372           BISB    #10,@ML.REG+40                  ;                               1030
23721 104052  005067  107744                   CLR     IO.BUF                          ;                               1030
23722 104056  004767  114230                   JSR     PC,GD.BLK.XFER                  ;                               1030
23723 104062  012777  000061  111314           MOV     #61,@ML.REG                     ;
23724 104070  105777  111360          1$:      TSTB    @ML.REG+50
23725 104074  100375                          BPL     1$                                                              1030
23726 104076  005005                          CLR     R5                              ; PLOG.SEL                      1031
23727 104100  010504                  2$:      MOV     R5,R4                           ; PLOG.SEL,*
23728 104102  006304                          ASL     R4
23729 104104  066407  104110                   ADD     3$(R4),PC
23730 104110  000016                  3$:      .WORD   4$-3$
23731 104112  000022                          .WORD   5$-3$
23732 104114  000030                          .WORD   6$-3$
23733 104116  000036                          .WORD   7$-3$
23734 104120  000044                          .WORD   8$-3$
23735 104122  000052                          .WORD   9$-3$
23736 104124  000060                          .WORD   10$-3$
23737 104126  005003                  4$:      CLR     R3                              ; PLOG                          1031
23738 104130  000421                          BR      11$                             ;                               1031
23739 104132  012703  000001          5$:      MOV     #1,R3                           ; *,PLOG                        1031
23740 104136  000416                          BR      11$                             ;                               1031
23741 104140  012703  000002          6$:      MOV     #2,R3                           ; *,PLOG                        1032
23742 104144  000413                          BR      11$                             ;                               1031
23743 104146  012703  000003          7$:      MOV     #3,R3                           ; *,PLOG                        1032
23744 104152  000410                          BR      11$                             ;                               1031
23745 104154  012703  000004          8$:      MOV     #4,R3                           ; *,PLOG                        1032
23746 104160  000405                          BR      11$                             ;                               1031
23747 104162  012703  000005          9$:      MOV     #5,R3                           ; *,PLOG                        1033
23748 104166  000402                          BR      11$                             ;                               1031
23749 104170  012703  000072          10$:     MOV     #72,R3                          ; *,PLOG                        1033
23750 104174  012704  000001          11$:     MOV     #1,R4                           ; *,CHANNEL                     1033
23751 104200  104402                  12$:     TRAP    2                               ;                               1033
23752 104202  152777  000040  111234           BISB    #40,@ML.REG+40                  ;                               1033
23753 104210  016702  111616                   MOV     ML.DUT,R2
23754 104214  042702  177770                   BIC     #177770,R2
23755 104220  142777  000007  111216           BICB    #7,@ML.REG+40
```

```
23757                                   ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
23758                                   ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
23759
23760 104226  150277  111212                    BISB    R2,@ML.REG+40
23761 104232  005001                            CLR     R1                      ; COUNT                         1034
23762 104234  010102                    13$:    MOV     R1,R2                   ; COUNT,*                       1034
23763 104236  006302                            ASL     R2
23764 104240  005062  014022                    CLR     IO.BUF(R2)
23765 104244  005201                            INC     R1                      ; COUNT                         1034
23766 104246  020127  000377                    CMP     R1,#377                 ; COUNT,*
23767 104252  003770                            BLE     13$
23768 104254  010346                            MOV     R3,-(SP)                ; PLOG,*                        1034
23769 104256  010446                            MOV     R4,-(SP)                ; CHANNEL,*
23770 104260  004767  113546                    JSR     PC,FORCE.REM
23771 104264  117702  111274                    MOVB    @ML.REG+160,R2          ;                               1034
23772 104270  042702  177700                    BIC     #177700,R2
23773 104274  142777  000077  111252            BICB    #77,@ML.REG+150
23774 104302  150277  111246                    BISB    R2,@ML.REG+150
23775 104306  004767  114000                    JSR     PC,GD.BLK.XFER          ;                               1034
23776 104312  142777  000002  111204            BICB    #2,@ML.REG+120          ;                               1034
23777 104320  012777  000071  111056            MOV     #71,@ML.REG             ;                               1034
23778 104326  105777  111122            14$:    TSTB    @ML.REG+50
23779 104332  100375                            BPL     14$
23780 104334  132777  000100  111122            BITB    #100,@ML.REG+60         ;                               1035
23781 104342  001403                            BEQ     15$
23782 104344  005777  111244                    TST     @ML.REG+210
23783 104350  100444                            BMI     17$
23784 104352  005267  111020            15$:    INC     P.CNT                   ;                               1035
23785 104356  026767  111014  111014            CMP     P.CNT,LIMIT
23786 104364  003402                            BLE     16$
23787 104366  022626                            CMP     (SP)+,(SP)+
23788 104370  000520                            BR      22$
23789 104372  104455                    16$:    TRAP    55                      ;                               1035
23790 104374  000212                            .WORD   212
23791 104376  012750                            .WORD   SYNC
23792 104400  026302                            .WORD   DUMPER
23793 104402  012746  010616                    MOV     #WRD.9,-(SP)            ;                               1035
23794 104406  012746  011562                    MOV     #WRD.76,-(SP)
23795 104412  012746  010630                    MOV     #WRD.10,-(SP)
23796 104416  012746  011570                    MOV     #WRD.77,-(SP)
23797 104422  012746  010270                    MOV     #FOR.FMT,-(SP)
23798 104426  012746  000005                    MOV     #5,-(SP)
23799 104432  010600                            MOV     SP,R0                   ; SP,*
23800 104434  104414                            TRAP    14
23801 104436  010416                            MOV     R4,(SP)                 ; CHANNEL,*                     1035
23802 104440  010346                            MOV     R3,-(SP)                ; PLOG,*
23803 104442  012746  007754                    MOV     #FMT.21,-(SP)
23804 104446  012746  C00003                    MOV     #3,-(SP)
23805 104452  010600                            MOV     SP,R0                   ; SP,*
23806 104454  104414                            TRAP    14
23807 104456  062706  000022                    ADD     #22,SP                  ;                               1035
23808 104462  005001                    17$:    CLR     R1                      ; CNT                           1036
23809 104464  010102                    18$:    MOV     R1,R2                   ; CNT,*                         1036
23810 104466  006302                            ASL     R2
23811 104470  005762  014022                    TST     IO.BUF(R2)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

104474  001444                                  BEQ     19$
104476  005267  110674                          INC     P.CNT                   ;                                       1036
104502  026767  110670  110670                  CMP     P.CNT,LIMIT
104510  003042                                  BGT     20$
104512  104455                                  TRAP    55                      ;                                       1036
104514  000213                                  .WORD   213
104516  012750                                  .WORD   SYNC
104520  026302                                  .WORD   DUMPER
104522  012746  011462                          MOV     #WRD.67,-(SP)           ;                                       1036
104526  012746  010650                          MOV     #WRD.12,-(SP)
104532  012746  011552                          MOV     #WRD.75,-(SP)
104536  012746  011540                          MOV     #WRD.74,-(SP)
104542  012746  011416                          MOV     #WRD.61,-(SP)
104546  012746  010304                          MOV     #FIV.FMT,-(SP)
104552  012746  000006                          MOV     #6,-(SP)
104556  010600                                  MOV     SP,R0                   ; SP,*
104560  104414                                  TRAP    14
104562  010416                                  MOV     R4,(SP)                 ; CHANNEL,*                             1036
104564  010346                                  MOV     R3,-(SP)                ; PLOG,*
104566  012746  007754                          MOV     #FMT.21,-(SP)
104572  012746  000003                          MOV     #3,-(SP)
104576  010600                                  MOV     SP,R0                   ; SP,*
104600  104414                                  TRAP    14
104602  062706  000024                          ADD     #24,SP                  ;                                       1036
104606  005201                          19$:    INC     R1                      ; CNT                                   1036
104610  020127  000014                          CMP     R1,#14                  ; CNT,*
104614  003723                                  BLE     18$
104616  022626                          20$:    CMP     (SP)+,(SP)+             ;                                       1033
104620  104467                                  TRAP    67                      ;                                       1037
104622  006000                                  ROR     R0
104624  103002                                  BHIS    22$
104626  000167  177346                  21$:    JMP     12$
104632  005204                          22$:    INC     R4                      ; CHANNEL                               1033
104634  020427  000043                          CMP     R4,#43                  ; CHANNEL,*
104640  003772                                  BLE     21$
104642  005205                                  INC     R5                      ; PLOG.SEL                              1030
104644  020527  000006                          CMP     R5,#6                   ; PLOG.SEL,*
104650  003002                                  BGT     23$
104652  000167  177222                          JMP     2$
104656  000207                          23$:    RTS     PC                      ;                                       1026

                                        ; Routine Size:  202 words
                                        ; Maximum stack depth per invocation:  18 words
```

```
                                        ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                        ;                TEST CODE SECTION      29-Mar-1982 16:21:03    PA:<
                                                .SBTTL  T53 TEST CODE SECTION
                                        T53::
                                        1$:     JSR     PC,$T53                 ;                       1037
                                                TRAP    66
                                                ROR     R0
                                                BLO     1$
                                                RTS     PC
                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
```

```
23894 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
23895 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)
23896 ;
23897 ;          10379 !
23898 ;          10380 BGNTST;
23899 ;          10381
23900 ;          10382 !++
23901 ;          10383 ! TEST NUMBER:  TST 54
23902 ;          10384 !
23903 ;          10385 ! TEST NAME:            SINGLE BIT ERROR SYNDRONE GENERATION & DECODE TEST
23904 ;          10386 !
23905 ;          10387 ! TEST DESCRIPTION:
23906 ;          10388 !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
23907 ;          10389 !       AND ERROR CORRECTION FOR SINGLE BIT CHANNEL
23908 ;          10390 !       ERRORS BY:
23909 ;          10391 !
23910 ;          10392 !       1.  CLEAR THE FIRST CRC GROUP IN THE
23911 ;          10393 !           IO_BUF AND GOOD BLOCK TO ZEROES
23912 ;          10394 !
23913 ;          10395 !       2.  VIA DATA DIAGNOSTIC MODE FLIP A BIT
23914 ;          10396 !           TO A ONE
23915 ;          10397 !
23916 ;          10398 !       3.  THEN DO A MASS BUS READ TRANSFER AND
23917 ;          10399 !           EXAMIN THE IO_BUF FOR ZEROES INDICATING
23918 ;          10400 !           THE CORRECTION WAS PERFORMED
23919 ;          10401 !
23920 ;          10402 !       4.  REPEAT WITH ALL BITS IN THE CRC GROUP
23921 ;          10403 !
23922 ;          10404 ! IMPLICIT INPUTS:
23923 ;          10405 !       IO_BUF
23924 ;          10406 !       A  VECTOR OF 256 WORDS WHERE DATA
23925 ;          10407 !       FOR MBUS READS AND WRITES TRANSFERS
23926 ;          10408 !       IS FOUND.
23927 ;          10409 !
23928 ;          10410 !       PD_TEMP
23929 ;          10411 !       A BIT VECTOR OF 16 BITS WHERE THE READ
23930 ;          10412 !       PROM DATA IS STORED AND ACCESSED FROM.
23931 ;          10413 !
23932 ;          10414 !
23933 ;          10415 !--
23934 ;          10416
23935 ;          10417 local
23936 ;          10418     DONE,                                 !DONE FLAG
23937 ;          10419     NIB_PAT : bitvector [4],              !STORAGE FOR SBE DATA GENERATED
23938 ;          10420     NIB_SEL,                              !POINTER WHERE SBE IS TO BE WRITTEN
23939 ;          10421     GD_WRD_CNT;                           !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
23940 ;          10422
23941 ;          10423 CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
23942 ;          10424
23943 ;          10425 incr WRD_CNT from 0 to 5 do               !FORCE SINGLE BIT ERRORS IN ONE CRC GROUP
23944 ;          10426     begin
23945 ;          10427
23946 ;          10428     incr BIT_CNT from 0 to 35 do          !FORCE SBE'S AT EACH BIT OF A WORD
23947 ;          10429         begin
23948 ;          10430
```

```
23950 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
23951 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)
23952 ;
23953 ;          10431         incr CNT from 0 to 255 do                !CLEAR FIRST CRC GROUP OF IO_BUF
23954 ;          10432             IO_BUF [.CNT] = ZEROES;
23955 ;          10433
23956 ;          10434         CLR_MBUS;                                !CLEAR THE DRIVE
23957 ;          10435         GD_BLK_XFER ();                          !SET UP A GOOF BLOCK TRANSFER
23958 ;          10436         MLCS1 = write;                           !DO A WRITE TRANSFER
23959 ;          10437         TIME_OUT_LOOP;                           !WAIT UNTIL THE TRANSFER IS COMPLETE
23960 ;          10438         CLR_MBUS;                                !CLEAR THE DRIVE AGAIN
23961 ;          10439         DONE = ZERO;                             !CLEAR THE DONE FLAG
23962 ;          10440         GD_WRD_CNT = -1;                         !RESET THE COUNT
23963 ;          10441         MLD1 = ZEROES;                           !LOAD THE DATA DIAG REG (BITS 0-38)
23964 ;          10442         MLD2 = ZEROES;                           !WITH ZEROES PAT AND CRC BIT FOR
23965 ;          10443         MLE2 = %o'060000';                       !ZEROES PAT
23966 ;          10444         NIB_SEL = .BIT_CNT/4;                    !CALCULATE THE NIBBLE WHERE THE SBE IS TO GO
23967 ;          10445         DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE TRANSFER
23968 ;          10446         MLCS1 = write;                           !DO A WRITE TRANSFER
23969 ;          10447         DELAY (ONE_US);                          !GIVE THE PROM DATA TIME TO GET OUT
23970 ;          10448
23971 ;          10449         do                                       !FIND THE GOOD NIB AT THE TESTED WORD
23972 ;          10450             begin
23973 ;          10451             PD_TEMP = .MLPD;                     !READ THE PROM DATA FOR THIS ARRAY WORD
23974 ;          10452
23975 ;          10453             if .PD_TEMP [.NIB_SEL] IS_SET        !IS THIS A GOOD NIBBLE
23976 ;          10454             then
23977 ;          10455                 DAT_CLK = ONE                    !IF NOT THEN GET THE NEXT ARRAY WORD
23978 ;          10456             else
23979 ;          10457                 begin                            !ELSE SEE IF WE ARE AT THE TESTED WORD
23980 ;          10458                 GD_WRD_CNT = .GD_WRD_CNT + 1;    !UP THE COUNT
23981 ;          10459                                                  !AND SEE IF WE ARE DONE
23982 ;          10460
23983 ;          10461                 if .GD_WRD_CNT eql .WRD_CNT then DONE = ONE else DAT_CLK = ONE;
23984 ;          10462
23985 ;          10463                 end;
23986 ;          10464
23987 ;          10465             end
23988 ;          10466         until .DONE IS_SET;                      !REPEAT UNTIL WE ARE DONE
23989 ;          10467
23990 ;          10468         NIB_PAT = ZEROES;                        !CLEAR THE SAVE LOCATION
23991 ;          10469         NIB_PAT [.BIT_CNT mod 4] = ONE;          !AND SET THE SBE IN THIS NIBBLE
23992 ;          10470         D1_TEMP = ZEROES;                        !CLEAR THE OTHER NIBBLES IN THIS ARRAY WORD
23993 ;          10471         D2_TEMP = ZEROES;                        !TO BE ZEROES PATTERN AND ZEROES CRC PATTERN
23994 ;          10472         E2_TEMP = %o'060000';
23995 ;          10473         LD_LNG_WRD (.NIB_SEL, .NIB_PAT);         !LOAD THE SBE INTO THE SAVE LOCATION
23996 ;          10474         WRT_LNG_WRD;                             !AND WRITE THE SBE INTO THE DATA DIAG RES'S
23997 ;          10475         DAT_CLK = ONE;                           !CLOCK THE SBE INTO THE ARRAYS MEMORY
23998 ;          10476         DELAY (ONE_US);                          !GIVE IT TIME TO WRITE INTO THE MEMORY
23999 ;          10477         BGNSUB;                                  !START OF SCOPE LOOP
24000 ;          10478         CLR_MBUS;                                !CLEAR OUT THE DATA DIAG MODE XFERR
24001 ;          10479         GD_BLK_XFER ();                          !SET UP A GOOD BLOCK TRANSFER
24002 ;          10480         ECC_DIS = ZERO;                          !CLEAR ECC DISABLE
24003 ;          10481         MLCS1 = read;                            !AND READ OUT THE SBE
24004 ;          10482         TIME_OUT_LOOP;
```

```
24006 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24007 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)
24008 ;
24009 ;          10483
24010 ;          10484          incr CNT from 0 to 13 do          !SEE IF THE SBE WAS CORRECTED
24011 ;          10485
24012 ;          10486              if .IO_BUF [.CNT] neq ZEROES  !TEST THE IO_BUF FOR ALL ZEROES
24013 ;          10487              then
24014 ;          10488                  begin                     !ERROR IF THE ERROR WAS NOT CORRECTED
24015 ;          10489                  CMP_THRESHOLD;            !COMPARE ERROR PRINT THRESHOLD
24016 ;          10490                  ERRDF (140, SYNC, DUMPER);
24017 ;          10491                  PRINTB (THR_FMT, PHR_12, WRD_76, WRD_9);
24018 ;          10492                  PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
24019 ;          10493                  end;
24020 ;          10494
24021 ;          10495          ENDSUB;                           !END OF SCOPE LOOP
24022 ;          10496          end;
24023 ;          10497
24024 ;          10498      end;
24025 ;          10499
24026 ;          10500 ENDTST;
24030
24031                                          .SBTTL  $T54 TEST CODE SECTION
24035 104674  004167  077712          $T54:   JSR     R1,$SAVE5                       ;                       1037
24036 104700  162706  000010                  SUB     #10,SP
24037 104704  005067  110466                  CLR     P.CNT                           ;                       1042
24038 104710  005001                          CLR     R1                              ; WRD.CNT               1042
24039 104712  005002                  1$:     CLR     R2                              ; BIT.CNT               1042
24040 104714  005003                  2$:     CLR     R3                              ; CNT                   1043
24041 104716  010304                  3$:     MOV     R3,R4                           ; CNT,*                 1043
24042 104720  006304                          ASL     R4
24043 104722  005064  014022                  CLR     IO.BUF(R4)
24044 104726  005203                          INC     R3                              ; CNT                   1043
24045 104730  020327  000377                  CMP     R3,#377                         ; CNT,*
24046 104734  003770                          BLE     3$
24047 104736  152777  000040  110500          BISB    #40,@ML.REG+40                  ;                       1043
24048 104744  016704  111062                  MOV     ML.DUT,R4
24049 104750  042704  177770                  BIC     #177770,R4
24050 104754  142777  000007  110462          BICB    #7,@ML.REG+40
24051 104762  150477  110456                  BISB    R4,@ML.REG+40
24052 104766  004767  113320                  JSR     PC,GD.BLK.XFER                  ;                       1043
24053 104772  012777  000061  110404          MOV     #61,@ML.REG                     ;                       1043
24054 105000  105777  110450          4$:     TSTB    @ML.REG+50
24055 105004  100375                          BPL     4$
24056 105006  152777  000040  110430          BISB    #40,@ML.REG+40                  ;                       1043
24057 105014  016704  111012                  MOV     ML.DUT,R4
24058 105020  042704  177770                  BIC     #177770,R4
24059 105024  142777  000007  110412          BICB    #7,@ML.REG+40
24060 105032  150477  110406                  BISB    R4,@ML.REG+40
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

105036  005066  000002                          CLR     2(SP)                           ; DONE                                  1043
105042  012716  177777                          MOV     #-1,(SP)                        ; *,GD.WRD.CNT                          1044
105046  005077  110522                          CLR     @ML.REG+170                     ;                                       1044
105052  005077  110526                          CLR     @ML.REG+200                     ;                                       1044
105056  012777  060000  110500                  MOV     #60000,@ML.REG+160              ;                                       1044
105064  010246                                  MOV     R2,-(SP)                        ; BIT.CNT,*                             1044
105066  012746  000004                          MOV     #4,-(SP)
105072  004767  077350                          JSR     PC,BL$DIV
105076  010005                                  MOV     R0,R5                           ; *,NIB.SEL
105100  004767  111306                          JSR     PC,DAT.DM.XFER                  ;                                       1044
105104  012777  000061  110272                  MOV     #61,@ML.REG                     ;                                       1044
105112  012703  000001                          MOV     #1,R3                           ; *,$$TMP2                              1044
105116  001411                          5$:     BEQ     8$
105120  016704  074772                          MOV     L$DLY,R4                        ; *,$$TMP1
105124  001404                                  BEQ     7$
105126  005066  000012                  6$:     CLR     12(SP)                          ; $$TMP
105132  005304                                  DEC     R4                              ; $$TMP1
105134  001374                                  BNE     6$
105136  005303                          7$:     DEC     R3                              ; $$TMP2
105140  000766                                  BR      5$
105142  010504                          8$:     MOV     R5,R4                           ; NIB.SEL,*                             1045
105144  006204                                  ASR     R4
105146  006204                                  ASR     R4
105150  006204                                  ASR     R4
105152  062704  015342                          ADD     #PD.TEMP,R4
105156  017767  110452  110156          9$:     MOV     @ML.REG+230,PD.TEMP             ;                                       1045
105164  010446                                  MOV     R4,-(SP)                        ;                                       1045
105166  010546                                  MOV     R5,-(SP)                        ; NIB.SEL,*
105170  042716  177770                          BIC     #177770,(SP)
105174  012746  000001                          MOV     #1,-(SP)
105200  005046                                  CLR     -(SP)
105202  004767  076426                          JSR     PC,BL$GT2
105206  062706  000010                          ADD     #10,SP
105212  005300                                  DEC     R0
105214  001411                                  BEQ     10$                             ;                                       1045
105216  005266  000004                          INC     4(SP)                           ; GD.WRD.CNT                            1045
105222  026601  000004                          CMP     4(SP),R1                        ; GD.WRD.CNT,WRD.CNT                    1046
105226  001004                                  BNE     10$
105230  012766  000001  000006                  MOV     #1,6(SP)                        ; *,DONE
105236  000403                                  BR      11$
105240  152777  000020  110256          10$:    BISB    #20,@ML.REG+120
105246  026627  000006  000001          11$:    CMP     6(SP),#1                        ; DONE,*                                1046
105254  001340                                  BNE     9$
105256  005066  000010                          CLR     10(SP)                          ; NIB.PAT                               1046
105262  010246                                  MOV     R2,-(SP)                        ; BIT.CNT,*                             1046
105264  012746  000004                          MOV     #4,-(SP)
105270  004767  077164                          JSR     PC,BL$MOD
105274  010004                                  MOV     R0,R4
105276  006200                                  ASR     R0
105300  006200                                  ASR     R0
105302  006200                                  ASR     R0
105304  012703  000014                          MOV     #14,R3
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

105310  060603                                  ADD     SP,R3                           ; NIB.PAT,*
105312  060300                                  ADD     R3,R0
105314  010016                                  MOV     R0,(SP)
105316  010446                                  MOV     R4,-(SP)
105320  042716  177770                          BIC     #177770,(SP)
105324  012746  000001                          MOV     #1,-(SP)
105330  011646                                  MOV     (SP),-(SP)
105332  004767  076534                          JSR     PC,BL$PU2
105336  005067  106032                          CLR     D1.TEMP                         ;                                       1047
105342  005067  106030                          CLR     D2.TEMP                         ;                                       1047
105346  012767  060000  106024                  MOV     #60000,E2.TEMP                  ;                                       1047
105354  010516                                  MOV     R5,(SP)                         ; NIB.SEL,*                             1047
105356  016646  000022                          MOV     22(SP),-(SP)                    ; NIB.PAT,*
105362  004767  113766                          JSR     PC,LD.LNG.WRD
105366  016777  106002  110200                  MOV     D1.TEMP,@ML.REG+170
105374  016777  105776  110202                  MOV     D2.TEMP,@ML.REG+200
105402  016777  105772  110154                  MOV     E2.TEMP,@ML.REG+160
105410  152777  000020  110106                  BISB    #20,@ML.REG+120                 ;                                       1047
105416  012703  000001                          MOV     #1,R3                           ; *,$$TMP2                              1047
105422  001411                          12$:    BEQ     15$
105424  016704  074466                          MOV     L$DLY,R4                        ; *,$$TMP1
105430  001404                                  BEQ     14$
105432  005066  000026                  13$:    CLR     26(SP)                          ; $$TMP
105436  005304                                  DEC     R4                              ; $$TMP1
105440  001374                                  BNE     13$
105442  005303                          14$:    DEC     R3                              ; $$TMP2
105444  000766                                  BR      12$
105446  104402                          15$:    TRAP    2
105450  152777  000040  107766                  BISB    #40,@ML.REG+40                  ;                                       1047
105456  016704  110350                          MOV     ML.DUT,R4
105462  042704  177770                          BIC     #177770,R4
105466  142777  000007  107750                  BICB    #7,@ML.REG+40
105474  150477  107744                          BISB    R4,@ML.REG+40
105500  004767  112606                          JSR     PC,GD.BLK.XFER                  ;                                       1047
105504  142777  000002  110012                  BICB    #2,@ML.REG+120                  ;                                       1048
105512  012777  000071  107664                  MOV     #71,@ML.REG                     ;                                       1048
105520  105777  107730                  16$:    TSTB    @ML.REG+50
105524  100375                                  BPL     16$
105526  005003                                  CLR     R3                              ; CNT                                   1048
105530  010304                          17$:    MOV     R3,R4                           ; CNT,*                                 1048
105532  006304                                  ASL     R4
105534  005764  014022                          TST     IO.BUF(R4)
105540  001440                                  BEQ     18$
105542  005267  107630                          INC     P.CNT                           ;                                       1048
105546  026767  107624  107624                  CMP     P.CNT,LIMIT
105554  003036                                  BGT     19$
105556  104455                                  TRAP    55                              ;                                       1049
105560  000214                                  .WORD   214
105562  012750                                  .WORD   SYNC
105564  026302                                  .WORD   DUMPER
105566  012746  010616                          MOV     #WRD.9,-(SP)                    ;                                       1049
105572  012746  011562                          MOV     #WRD.76,-(SP)
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<
                                        
105576  012746  012036                        MOV     #PHR.12,-(SP)
105602  012746  010256                        MOV     #THR.FMT,-(SP)
105606  012746  000004                        MOV     #4,-(SP)
105612  010600                              MOV     SP,R0                   ; SP,*
105614  104414                              TRAP    14
105616  010216                              MOV     R2,(SP)                 ; BIT.CNT,*                     1049
105620  010146                              MOV     R1,-(SP)                ; WRD.CNT,*
105622  012746  010026                      MOV     #FMT.22,-(SP)
105626  012746  000003                      MOV     #3,-(SP)
105632  010600                              MOV     SP,R0                   ; SP,*
105634  104414                              TRAP    14
105636  062706  000020                      ADD     #20,SP                  ;                               1048
105642  005203                      18$:    INC     R3                      ; CNT                           1048
105644  020327  000015                      CMP     R3,#15                  ; CNT,*
105650  003727                              BLE     17$
105652  104467                      19$:    TRAP    67                      ;                               1049
105654  006000                              ROR     R0
105656  103673                              BLO     15$
105660  062706  000020                      ADD     #20,SP                  ;                               1042
105664  005202                              INC     R2                      ; BIT.CNT                       1042
105666  020227  000043                      CMP     R2,#43                  ; BIT.CNT,*
105672  003002                              BGT     20$
105674  000167  177014                      JMP     2$
105700  005201                      20$:    INC     R1                      ; WRD.CNT                       1042
105702  020127  000005                      CMP     R1,#5                   ; WRD.CNT,*
105706  003002                              BGT     21$
105710  000167  176776                      JMP     1$
105714  062706  000010              21$:    ADD     #10,SP                  ;                               1037
105720  000207                              RTS     PC

                                        ; Routine Size:  267 words
                                        ; Maximum stack depth per invocation:  26 words


                                                .SBTTL  T54 TEST CODE SECTION
105722                                  T54::
105722  004767  176746                  1$:     JSR     PC,$T54                 ;                       1049
105726  104466                              TRAP    66
105730  006000                              ROR     R0
105732  103773                              BLO     1$
105734  000207                              RTS     PC
```

```
24230                                   ;ML4AD                                  29-Mar-1982 16:23:04    TCPS
24231                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
24232
24233
24234                                   ; Routine Size:  6 words
24235                                   ; Maximum stack depth per invocation:  0 words
24240
24241
24242 ;           10501 !<BLF/PAGE>
```

```
24244 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24245 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (107)
24246 ;
24247 ;          10502 !
24248 ;          10503 BGNTST;
24249 ;          10504
24250 ;          10505 !++
24251 ;          10506 ! TEST NUMBER:  TST 55
24252 ;          10507 !
24253 ;          10508 ! TEST NAME:            MULTIPLE BIT ERROR SYNDRONE GENERATION AND DECODE TEST
24254 ;          10509 !
24255 ;          10510 ! TEST DESCRIPTION:
24256 ;          10511 !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
24257 ;          10512 !       AND ERROR CORRECTION FOR MULTIPLE BIT
24258 ;          10513 !       CHANNEL ERRORS BY:
24259 ;          10514 !
24260 ;          10515 !       1.  CLEAR THE FIRST CRC GROUP IN THE
24261 ;          10516 !           IO_BUF AND GOOD BLOCK TO ZEROES
24262 ;          10517 !
24263 ;          10518 !       2.  VIA DATA DIAG MODE FLIP ALL BITS IN
24264 ;          10519 !           A CHANNEL TO ONES
24265 ;          10520 !
24266 ;          10521 !       3.  THEN DO A MASS BUS READ TRANSFER AND
24267 ;          10522 !           EXAMIN THE IO_BUF FOR ZEROES INDICATING
24268 ;          10523 !           THE CORRECTION WAS PERFORMED
24269 ;          10524 !
24270 ;          10525 !       4.  REPEAT FOR ALL CHANNELS IN THE CRC GROUP
24271 ;          10526 !
24272 ;          10527 ! IMPLICIT INPUTS:
24273 ;          10528 !       PD_TEMP
24274 ;          10529 !       A BIT VECTOR OF 16 BITS WHERE THE READ
24275 ;          10530 !       PROM DATA IS STORED OAND ACCESSED FROM.
24276 ;          10531 !
24277 ;          10532 !       IO_BUF
24278 ;          10533 !       A  VECTOR OF 256 WORDS WHERE DATA
24279 ;          10534 !       FOR MBUS READS AND WRITES TRANSFERS
24280 ;          10535 !       IS FOUND.
24281 ;          10536 !
24282 ;          10537 !
24283 ;          10538 !--
24284 ;          10539
24285 ;          10540 local
24286 ;          10541     NIB_PAT : bitvector [4],              !STORAGE FOR SBE TO BE GENERATED
24287 ;          10542     NIB_SEL,                              !POINTER TO WHERE ERROR IS TO BE WRITTEN
24288 ;          10543     GD_WRD_CNT;                           !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
24289 ;          10544
24290 ;          10545 CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
24291 ;          10546 E2_TEMP<12, 3> = %b'110';                 !LOAD DATA STRUCTURE WITH ZEROES CRC PATTERN
24292 ;          10547
24293 ;          10548 incr BIT_CNT from 0 to 35 do              !TEST FOR MULTILPLE ERRORS AT 36 CHANNELS
24294 ;          10549     begin
24295 ;          10550     CLR_MBUS;                             !CLEAR THE DRIVE
24296 ;          10551
24297 ;          10552     incr CNT from 0 to 255 do             !CLEAR FIRST CRC GROUP IN THE IO_BUF
24298 ;          10553         IO_BUF [.CNT] = ZEROES;
```

```
24300 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24301 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (107)
24302 ;
24303 ;          10554
24304 ;          10555      GD_BLK_XFER ();                     !ALSO CLEAR THTE FIRST CRC GROUP
24305 ;          10556      MLCS1 = write;                      !IN THE ML11'S GOOD BLOCK
24306 ;          10557      TIME_OUT_LOOP;
24307 ;          10558      GD_WRD_CNT = ZERO;                  !CLEAR COUNT
24308 ;          10559      D1_TEMP = ZEROES;                   !CLEAR D1_TEMP
24309 ;          10560      D2_TEMP = ZEROES;                   !CLEAR D2_TEMP
24310 ;          10561      NIB_PAT = ZEROES;                   !CLEAR NIBBLE PATTERN
24311 ;          10562      NIB_SEL = .BIT_CNT/4;               !CALCULATE THE NIBBLE TO BE IN ERROR
24312 ;          10563      NIB_PAT [.BIT_CNT mod 4] = ONE;     !CALCULATE AND THE BIT TO BE IN ERROR
24313 ;          10564      LD_LNG_WRD (.NIB_SEL, .NIB_PAT);    !LOAD THE ERROR IN D1_TEMP OR D2_TEMP
24314 ;          10565      WRT_LNG_WRD;                        !LOAD THE REGISTER WITH THE ERROR
24315 ;          10566      DAT_DM_XFER ();                     !SET UP A DATA DIAG MODE TRANSFER
24316 ;          10567      MLCS1 = write;                      !DO A WRITE TRANSFER
24317 ;          10568      DELAY (ONE_US);                     !GIVE THE PROM DATA TIME TO COME OUT
24318 ;          10569
24319 ;          10570      do                                  !LOAD THIS CHANNEL WITH MULTIPLE ERRORS
24320 ;          10571          begin
24321 ;          10572          PD_TEMP = .MLPD;                !READ THIS ARRAY WORDS PROM_DATA
24322 ;          10573
24323 ;          10574          if .PD_TEMP [.NIB_SEL] IS_SET   !SEE IF THIS A GOOD NIBBLE
24324 ;          10575          then
24325 ;          10576              DAT_CLK = ONE               !CLOCK OUT ANOTHER ARRAY WORD IF BAD
24326 ;          10577          else
24327 ;          10578              begin                       !ELSE CLOCK IN THE ERROR INTO A GOOD NIBBLE
24328 ;          10579              GD_WRD_CNT = .GD_WRD_CNT + 1;
24329 ;          10580              DAT_CLR = ONE;
24330 ;          10581              end;
24331 ;          10582
24332 ;          10583          end
24333 ;          10584      until .GD_WRD_CNT eql 6;            !REPEAT UNTIL 6 WORDS ARE WRITTEN
24334 ;          10585
24335 ;          10586      BGNSUB;                             !START OF SCOPE LOOP
24336 ;          10587      CLR_MBUS;                           !CLEAR OUT THE DATA DISG MODE TRANSFER
24337 ;          10588      GD_BLK_XFER ();                     !SET UP A GOOD BLOCK TRANSFER
24338 ;          10589      ECC_DIS = 0;                        !ENABLE ERROR CORRECTION
24339 ;          10590      MLCS1 = read;                       !READ OUT THE ERRORS
24340 ;          10591      TIME_OUT_LOOP;                      !WAIT FOR THE TRANSFER TO COMPLETE
24341 ;          10592
24342 ;          10593      incr WRD_CNT from 0 to 13 do        !SEE IF THE CORRECTIONS WHERE DONE
24343 ;          10594
24344 ;          10595          if .IO_BUF [.WRD_CNT] neq ZEROES    !TEST THE IO_BUF FOR ALL ZEROES
24345 ;          10596          then
24346 ;          10597              begin                       !REPORT THE ERROR IF ANY LOCATIONS ARE NOT ZEROES
24347 ;          10598              CMP_THRESHOLD;              !COMPARE ERROR PRINT THRESHOLD
24348 ;          10599              ERRDF (141, SYNC, DUMPER);
24349 ;          10600              PRINTB (THR_FMT, PHR_13, WRD_76, WRD_9);
24350 ;          10601              PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
24351 ;          10602              end;
24352 ;          10603
24353 ;          10604      ENDSUB;                             !END OF SCOPE LOOP
24354 ;          10605      end;
```

```
24356 ;ML4AD
24357 ;                 TEST CODE SECTION
24358
24359 ;          10606
24360 ;          10607 ENDTST;
24364
24365                                        .SBTTL  $T55 TEST CODE SECTION
24369 105736  004167  076650          $T55:  JSR     R1,$SAVE5                ;                              1050
24370 105742  024646                        CMP     -(SP),-(SP)
24371 105744  005067  107426                CLR     P.CNT                    ;                              1054
24372 105750  042767  070000  105422        BIC     #70000,E2.TEMP           ;                              1054
24373 105756  052767  060000  105414        BIS     #60000,E2.TEMP
24374 105764  005003                        CLR     R3                       ; BIT.CNT                      1054
24375 105766  152777  000040  107450  1$:   BISB    #40,@ML.REG+40           ;                              1054
24376 105774  016702  110032                MOV     ML.DUT,R2
24377 106000  042702  177770                BIC     #177770,R2
24378 106004  142777  000007  107432        BICB    #7,@ML.REG+40
24379 106012  150277  107426                BISB    R2,@ML.REG+40
24380 106016  005001                        CLR     R1                       ; CNT                          1055
24381 106020  010102                  2$:   MOV     R1,R2                    ; CNT,*                        1055
24382 106022  006302                        ASL     R2
24383 106024  005062  014022                CLR     IO.BUF(R2)
24384 106030  005201                        INC     R1                       ; CNT                          1055
24385 106032  020127  000377                CMP     R1,#377                  ; CNT,*
24386 106036  003770                        BLE     2$
24387 106040  004767  112246                JSR     PC,GD.BLK.XFER           ;                              1055
24388 106044  012777  000061  107332        MOV     #61,@ML.REG              ;                              1055
24389 106052  105777  107376          3$:   TSTB    @ML.REG+50
24390 106056  100375                        BPL     3$
24391 106060  005005                        CLR     R5                       ; GD.WRD.CNT                   1055
24392 106062  005067  105306                CLR     D1.TEMP                  ;                              1055
24393 106066  005067  105304                CLR     D2.TEMP                  ;                              1056
24394 106072  005016                        CLR     (SP)                     ; NIB.PAT                      1056
24395 106074  010346                        MOV     R3,-(SP)                 ; BIT.CNT,*                    1056
24396 106076  012746  000004                MOV     #4,-(SP)
24397 106102  004767  076340                JSR     PC,BL$DIV
24398 106106  010004                        MOV     R0,R4                    ; *,NIB.SEL
24399 106110  010346                        MOV     R3,-(SP)                 ; BIT.CNT,*                    1056
24400 106112  012746  000004                MOV     #4,-(SP)
24401 106116  004767  076336                JSR     PC,BL$MOD
24402 106122  010002                        MOV     R0,R2
24403 106124  006200                        ASR     R0
24404 106126  006200                        ASR     R0
24405 106130  006200                        ASR     R0
24406 106132  012701  000010                MOV     #10,R1
24407 106136  060601                        ADD     SP,R1                    ; NIB.PAT,*
24408 106140  060100                        ADD     R1,R0
24409 106142  010016                        MOV     R0,(SP)
24410 106144  010246                        MOV     R2,-(SP)
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

106146  042716  177770                          BIC     #177770,(SP)
106152  012746  000001                          MOV     #1,-(SP)
106156  011646                                  MOV     (SP),-(SP)
106160  004767  075706                          JSR     PC,BL$PU2
106164  010416                                  MOV     R4,(SP)                         ; NIB.SEL,*                     1056
106166  016646  000016                          MOV     16(SP),-(SP)                    ; NIB.PAT,*
106172  004767  113156                          JSR     PC,LD.LNG.WRD
106176  016777  105172  107370                  MOV     D1.TEMP,@ML.REG+170
106204  016777  105166  107372                  MOV     D2.TEMP,@ML.REG+200
106212  016777  105162  107344                  MOV     E2.TEMP,@ML.REG+160
106220  004767  110166                          JSR     PC,DAT.DM.XFER                  ;                               1056
106224  012777  000061  107152                  MOV     #61,@ML.REG                     ;                               1056
106232  012701  000001                          MOV     #1,R1                           ; *,$$TMP2                      1056
106236  001411                          4$:     BEQ     7$
106240  016702  073652                          MOV     L$DLY,R2                        ; *,$$TMP1
106244  001404                                  BEQ     6$
106246  005066  000022                  5$:     CLR     22(SP)                          ; $$TMP
106252  005302                                  DEC     R2                              ; $$TMP1
106254  001374                                  BNE     5$
106256  005301                          6$:     DEC     R1                              ; $$TMP2
106260  000766                                  BR      4$
106262  010402                          7$:     MOV     R4,R2                           ; NIB.SEL,*                     1057
106264  006202                                  ASR     R2
106266  006202                                  ASR     R2
106270  006202                                  ASR     R2
106272  062702  015342                          ADD     #PD.TEMP,R2
106276  017767  107332  107036          8$:     MOV     @ML.REG+230,PD.TEMP             ;                               1057
106304  010246                                  MOV     R2,-(SP)                        ;                               1057
106306  010446                                  MOV     R4,-(SP)                        ; NIB.SEL,*
106310  042716  177770                          BIC     #177770,(SP)
106314  012746  000001                          MOV     #1,-(SP)
106320  005046                                  CLR     -(SP)
106322  004767  075306                          JSR     PC,BL$GT2
106326  062706  000010                          ADD     #10,SP
106332  005300                                  DEC     R0
106334  001401                                  BEQ     9$                              ;                               1057
106336  005205                                  INC     R5                              ; GD.WRD.CNT                    1057
106340  152777  000020  107156          9$:     BISB    #20,@ML.REG+120                 ;                               1058
106346  020527  000006                          CMP     R5,#6                           ; GD.WRD.CNT,*                  1058
106352  001351                                  BNE     8$
106354  104402                          10$:    TRAP    2
106356  152777  000040  107060                  BISB    #40,@ML.REG+40                  ;                               1058
106364  016702  107442                          MOV     ML,DUT,R2
106370  042702  177770                          BIC     #177770,R2
106374  142777  000007  107042                  BICB    #7,@ML.REG+40
106402  150277  107036                          BISB    R2,@ML.REG+40
106406  004767  111700                          JSR     PC,GD.BLK.XFER                  ;                               1058
106412  142777  000002  107104                  BICB    #2,@ML.REG+120                  ;                               1058
106420  012777  000071  106756                  MOV     #71,@ML.REG                     ;                               1059
106426  105777  107022                  11$:    TSTB    @ML.REG+50
106432  100375                                  BPL     11$
106434  005001                                  CLR     R1                              ; WRD.CNT                       1059
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

106436  010102                          12$:    MOV     R1,R2                   ; WRD.CNT,*                     1059
106440  006302                                  ASL     R2
106442  005762  014022                          TST     IO.BUF(R2)
106446  001440                                  BEQ     13$
106450  005267  106722                          INC     P.CNT                   ;                               1059
106454  026767  106716  106716                  CMP     P.CNT,LIMIT
106462  003036                                  BGT     14$
106464  104455                                  TRAP    55                      ;                               1059
106466  000215                                  .WORD   215
106470  012750                                  .WORD   SYNC
106472  026302                                  .WORD   DUMPER
106474  012746  010616                          MOV     #WRD.9,-(SP)            ;                               1060
106500  012746  011562                          MOV     #WRD.76,-(SP)
106504  012746  012060                          MOV     #PHR.13,-(SP)
106510  012746  010256                          MOV     #THR.FMT,-(SP)
106514  012746  000004                          MOV     #4,-(SP)
106520  010600                                  MOV     SP,R0                   ; SP,*
106522  104414                                  TRAP    14
106524  010316                                  MOV     R3,(SP)                 ; BIT.CNT,*                     1060
106526  010146                                  MOV     R1,-(SP)                ; WRD.CNT,*
106530  012746  010026                          MOV     #FMT.22,-(SP)
106534  012746  000003                          MOV     #3,-(SP)
106540  010600                                  MOV     SP,R0                   ; SP,*
106542  104414                                  TRAP    14
106544  062706  000020                          ADD     #20,SP                  ;                               1059
106550  005201                          13$:    INC     R1                      ; WRD.CNT                       1059
106552  020127  000015                          CMP     R1,#15                  ; WRD.CNT,*
106556  003727                                  BLE     12$
106560  104467                          14$:    TRAP    67                      ;                               1060
106562  006000                                  ROR     R0
106564  103673                                  BLO     10$
106566  062706  000020                          ADD     #20,SP                  ;                               1054
106572  005203                                  INC     R3                      ; BIT.CNT                       1054
106574  020327  000043                          CMP     R3,#43                  ; BIT.CNT,*
106600  003002                                  BGT     15$
106602  000167  177160                          JMP     1$
106606  022626                          15$:    CMP     (SP)+,(SP)+             ;                               1050
106610  000207                                  RTS     PC

                                        ; Routine Size:  214 words
                                        ; Maximum stack depth per invocation:  24 words



                                                .SBTTL  T55 TEST CODE SECTION
```

```
24524                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
24525                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
24526
24530 106612                            T55::
24531 106612  004767  177120            1$:     JSR     PC,$T55                 ;                       1060
24532 106616  104466                            TRAP    66
24533 106620  006000                            ROR     R0
24534 106622  103773                            BLO     1$
24535 106624  000207                            RTS     PC
24536
24537                                   ; Routine Size:  6 words
24538                                   ; Maximum stack depth per invocation:  0 words
24543
24544
24545 ;         10608 !<BLF/PAGE>
```

```
;ML4AD
;                    TEST CODE SECTION

                10609 !
                10610 BGNTST;
                10611
                10612 !++
                10613 ! TEST NUMBER:  TST 56
                10614 !
                10615 ! TEST NAME:              ECC ERROR REGISTER TEST
                10616 !
                10617 ! TEST DESCRIPTION:
                10618 !       TEST THE ECC ERROR REGISTER FOR
                10619 !       CLEARING AND LATCHING OF ECC ERROR
                10620 !       INFORMATION ON DETTECTION
                10621 !       OF ECC ERRORS BY:
                10622 !
                10623 !       1.  THIS TEST IS TABLE DRIVEN.  DATA TABLE (DT_1)
                10624 !           CONTAINS ERROR FORCING DATA AND EXPECTED
                10625 !           MLEE DATA AS A RESULT OF THE FORCED ERROR
                10626 !
                10627 !       2.  THE TEST THEREFOR INDEXES INTO DT_1 TO FORCE
                10628 !           AN ECC ERROR
                10629 !
                10630 !       3.  A MASS BUS READ TRANSFER IS DONE
                10631 !
                10632 !       4.  DT_1 IS AGAIN INDEXED AND ITS CONTENTS
                10633 !           IS COMPARED AGAINST THE RESULTING
                10634 !           MLEE REGISTER  CONTENTS
                10635 !
                10636 !       5.  A MASS BUS CLEAR IS DONE AN MLEE IS CHECKED FOR
                10637 !           ZEROES
                10638 !
                10639 !       6.  THE ECH BIT IS ALSO EXAMINED FOR CORRECT
                10640 !           LATCHING INFORMATION
                10641 !
                10642 !
                10643 !
                10644 !--
                10645
                10646 local
                10647     TMP_E1,                       !TEMP STORAGE FOR E1 DATA WORD
                10648     FINISH,                       !VARIABLE ENDING CONDITION FOR LATCH_LOOP
                10649     ERR_FLG;                      !ERROR FLAG
                10650
                10651 CLR_MBUS;                         !CLEAR THE DRIVE
                10652 FINISH = 4;                       !MAKE LATCH_LOOP DO 5 LOOPS AT FIRST
                10653
                10654 incr CLR_LOOP from 0 to 1 do      !THE FIRST PASS TESTS MLEE FOR LATCHING
                10655     !THE SECOND PASS TESTS MLEE FOR CLEARING
                10656     begin
                10657
                10658     incr LATCH_LOOP from 0 to .FINISH do    !TEST MLEE FOR LATCHING BY USING DT_1 DATA
                10659         begin
                10660         BGNSUB;                   !START OF SCOPE LOOP
```

```
24603 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24604 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (108)
24605 ;
24606 ;          10661         ERR_FLG = ZERO;                  !CLEAR THE ERROR FLAG
24607 ;          10662         MLER = ZEROES;                   !CLEAR THE ERROR REGISTER
24608 ;          10663         ECC_DM = ONE;                    !ENABLE ECC DIAG MODE
24609 ;          10664         !+
24610 ;          10665         ! THE FOLLOWING ASSIGNMENT:
24611 ;          10666         !
24612 ;          10667         !       MLE1 = .TMP_E1
24613 ;          10668         !
24614 ;          10669         ! IS EQUIVALENT TO THE FOLLOWING
24615 ;          10670         ! TWO ASSINGMENTS:
24616 ;          10671         !
24617 ;          10672         !   PAR_CRC_WRD = .DT_1 [.LATCH_LOOP, P0_5];          !LOAD PAR_CRC_WRD WITH REM_TBL
24618 ;          10673         !   CRC_A = .DT_1 [.LATCH_LOOP, A0_5];                !LOAD CRC_A WITH REM_TBL
24619 ;          10674         !
24620 ;          10675         ! THIS IS NECESSARY DUE TO THE FACT THAT
24621 ;          10676         ! THE E1 REGISTER IS WORD ORIENTATED AND
24622 ;          10677         ! THE BLISS COMPILER GENERATES BYTE INST
24623 ;          10678         ! TO ACCESS THE REGISTER.
24624 ;          10679         !-
24625 ;          10680
24626 ;          10681         TMP_E1 = ZEROES;                                  !CLEAR OUT THE TEMP WORD
24627 ;          10682         TMP_E1<0, 6> = .DT_1 [.LATCH_LOOP, A0_5];             !LOAD CRC_A WITH REM_TBL
24628 ;          10683         TMP_E1<8, 6> = .DT_1 [.LATCH_LOOP, P0_5];             !LOAD PAR_CRC_WRD WITH REM_TBL
24629 ;          10684         MLE1 = .TMP_E1;                  !LOAD THE E1 REGISTER WITH DATA
24630 ;          10685
24631 ;          10686         CRC_B = .DT_1 [.LATCH_LOOP, B0_5];       !GET CRC_B FROM DT_1
24632 ;          10687         GD_BLK_XFER ();                  !SET UP A GOOD BLOCK TRANSFER
24633 ;          10688         ECC_DIS = ZERO;                  !DISABLE ECC DIABLE
24634 ;          10689         MLCS1 = read;                    !READ THE ERROR AND LACTH MLEE
24635 ;          10690         TIME_OUT_LOOP;
24636 ;          10691
24637 ;          10692         if .CRC_ERR neq .DT_1 [.LATCH_LOOP, CRC_DATA] then ERR_FLG = ONE;       !TEST CRC_ERR
24638 ;          10693
24639 ;          10694         if .SGL_ERR neq .DT_1 [.LATCH_LOOP, SGL_DATA] then ERR_FLG = ONE;       !TEST SGL_ERR
24640 ;          10695
24641 ;          10696         if .UNC_ERR neq .DT_1 [.LATCH_LOOP, UNC_DATA] then ERR_FLG = ONE;       !TEST UNC
24642 ;          10697
24643 ;          10698         if .BIT_IN_ERR neq .DT_1 [.LATCH_LOOP, E0_5] then ERR_FLG = ONE;        !TEST BIT IN ERROR
24644 ;          10699
24645 ;          10700         if .CHAN_IN_ERR neq .DT_1 [.LATCH_LOOP, C0_5] then ERR_FLG = ONE;       !TEST CHANNEL IN ERROR
24646 ;          10701
24647 ;          10702         if .ECH_ERR neq .DT_1 [.LATCH_LOOP, ECH_DATA]   !TEST IF ECH GOT SET
24648 ;          10703         then
24649 ;          10704             begin                        !REPORT ERROR IF NOT SET
24650 ;          10705             ERRDF (123, ASYNC, DUMPER);
24651 ;          10706             PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
24652 ;          10707             end;
24653 ;          10708
24654 ;          10709         if .ERR_FLG IS_SET               !TEST IF THE ERROR FLAG GOT SET
24655 ;          10710         then
24656 ;          10711             begin                        !REPORT ERROR IF SET
24657 ;          10712             ERRDF (124, SYNC, DUMPER);
```

```
24659 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24660 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (108)
24661
24662 ;          10713          PRINTB (THR_FMT, REG_14, WRD_52, PHR_11);
24663 ;          10714          PRINTB (FMT_1, .DT_1 [.LATCH_LOOP, EE_DATA], .MLEE);
24664 ;          10715          PRINTB (FMT_19, .DT_1 [.LATCH_LOOP, B0_5], .DT_1 [.LATCH_LOOP, A0_5], .DT_1 [.LATCH_LOOP, P0_5])
24665 ;          10716          end;
24666 ;          10717
24667 ;          10718      ENDSUB;                              !END OF SCOPE LOOP
24668 ;          10719      end;
24669 ;          10720
24670 ;          10721  CLR_MBUS;                               !CLEAR THE REGISTER
24671 ;          10722
24672 ;          10723  if .MLEE neq ZERO                       !SEE IF THE REGISTER GOT CLEARED
24673 ;          10724  then
24674 ;          10725      begin                               !REPORT ERROR IF NOT CLEARED
24675 ;          10726      ERRDF (125, SYNC, DUMPER);
24676 ;          10727      PRINTB (FOR_FMT, REG_14, WRD_52, FNC_7, WRD_14);
24677 ;          10728      end;
24678 ;          10729
24679 ;          10730  ECC_DM = ONE;                           !ENABLE ECC DISABLE
24680 ;          10731  FINISH = ZERO;                          !MAKE LATCH_LOOP LOOP ONCE TO CLEAR MLEE AGAIN
24681 ;          10732  end;
24682 ;          10733
24683 ;          10734 ENDTST;
24687
24688                                          .SBTTL  $T56 TEST CODE SECTION
24692 106626  004167  075760          $T56:   JSR     R1,$SAVE5                       ;                       1060
24693 106632  162706  000006                  SUB     #6,SP
24694 106636  152777  000040  106600          BISB    #40,@ML.REG+40                  ;                       1064
24695 106644  016705  107162                  MOV     ML.DUT,R5
24696 106650  042705  177770                  BIC     #177770,R5
24697 106654  142777  000007  106562          BICB    #7,@ML.REG+40
24698 106662  150577  106556                  BISB    R5,@ML.REG+40
24699 106666  011766  000004                  MOV     (PC),4(SP)              ; *,FINISH              1065
24700 106672  005066  000002                  CLR     2(SP)                   ; CLR.LOOP              1065
24701 106676  005004                  1$:     CLR     R4                      ; LATCH.LOOP            1065
24702 106700  000167  000656                  JMP     16$
24703 106704  010446                  2$:     MOV     R4,-(SP)                ; LATCH.LOOP,*          1068
24704 106706  012746  000006                  MOV     #6,-(SP)
24705 106712  004767  075304                  JSR     PC,BL$MUL
24706 106716  010005                          MOV     R0,R5
24707 106720  012701  015764                  MOV     #DT.1,R1                ;                       1069
24708 106724  060501                          ADD     R5,R1
24709 106726  012702  015766                  MOV     #DT.1+2,R2              ;                       1068
24710 106732  060502                          ADD     R5,R2
24711 106734  104402                  3$:     TRAP    2                       ;                       1065
24712 106736  005003                          CLR     R3                      ; ERR.FLG               1066
24713 106740  005077  106520                  CLR     @ML.REG+60              ;                       1066
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

106744  152777  000001  106552                  BISB    #1,@ML.REG+120                  ;                                       1066
106752  005066  000004                          CLR     4(SP)                           ; TMP.E1                                1068
106756  111200                                  MOVB    (R2),R0                         ;                                       1068
106760  042700  177700                          BIC     #177700,R0
106764  142766  000077  000004                  BICB    #77,4(SP)                       ; *,TMP.E1
106772  050066  000004                          BIS     R0,4(SP)                        ; *,TMP.E1
106776  011200                                  MOV     (R2),R0                         ;                                       1068
107000  006300                                  ASL     R0
107002  006300                                  ASL     R0
107004  042700  140377                          BIC     #140377,R0
107010  042766  037400  000004                  BIC     #37400,4(SP)                    ; *,TMP.E1
107016  050066  000004                          BIS     R0,4(SP)                        ; *,TMP.E1
107022  016677  000004  106524                  MOV     4(SP),@ML.REG+150               ; TMP.E1,*                              1068
107030  116500  015770                          MOVB    DT.1+4(R5),R0                   ;                                       1068
107034  042700  177700                          BIC     #177700,R0
107040  142777  000077  106516                  BICB    #77,@ML.REG+160
107046  150077  106512                          BISB    R0,@ML.REG+160
107052  004767  111234                          JSR     PC,GD.BLK.XFER                  ;                                       1068
107056  142777  000002  106440                  BICB    #2,@ML.REG+120                  ;                                       1068
107064  012777  000071  106312                  MOV     #71,@ML.REG                     ;                                       1068
107072  105777  106356                  4$:     TSTB    @ML.REG+50
107076  100375                                  BPL     4$
107100  011146                                  MOV     (R1),-(SP)                      ;                                       1069
107102  042716  157777                          BIC     #157777,(SP)
107106  017700  106502                          MOV     @ML.REG+210,R0
107112  042700  157777                          BIC     #157777,R0
107116  020026                                  CMP     R0,(SP)+
107120  001402                                  BEQ     5$
107122  012703  000001                          MOV     #1,R3                           ; *,ERR.FLG
107126  011146                          5$:     MOV     (R1),-(SP)                      ;                                       1069
107130  042716  137777                          BIC     #137777,(SP)
107134  017700  106454                          MOV     @ML.REG+210,R0
107140  042700  137777                          BIC     #137777,R0
107144  020026                                  CMP     R0,(SP)+
107146  001402                                  BEQ     6$
107150  012703  000001                          MOV     #1,R3                           ; *,ERR.FLG
107154  011146                          6$:     MOV     (R1),-(SP)                      ;                                       1069
107156  042716  077777                          BIC     #77777,(SP)
107162  017700  106426                          MOV     @ML.REG+210,R0
107166  042700  077777                          BIC     #77777,R0
107172  020026                                  CMP     R0,(SP)+
107174  001402                                  BEQ     7$
107176  012703  000001                          MOV     #1,R3                           ; *,ERR.FLG
107202  111146                          7$:     MOVB    (R1),-(SP)                      ;                                       1069
107204  042716  177700                          BIC     #177700,(SP)
107210  117700  106400                          MOVB    @ML.REG+210,R0
107214  042700  177700                          BIC     #177700,R0
107220  020026                                  CMP     R0,(SP)+
107222  001402                                  BEQ     8$
107224  012703  000001                          MOV     #1,R3                           ; *,ERR.FLG
107230  011146                          8$:     MOV     (R1),-(SP)                      ;                                       1070
107232  042716  170077                          BIC     #170077,(SP)
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

107236  017700  106352                          MOV     @ML.REG+210,R0
107242  042700  170077                          BIC     #170077,R0
107246  020026                                  CMP     R0,(SP)+
107250  001402                                  BEQ     9$
107252  012703  000001                          MOV     #1,R3                   ; *,ERR.FLG
107256  011246                          9$:     MOV     (R2),-(SP)              ;                                       1070
107260  005046                                  CLR     -(SP)
107262  032766  010000  000002                  BIT     #10000,2(SP)
107270  001401                                  BEQ     10$
107272  005216                                  INC     (SP)
107274  005000                          10$:    CLR     R0
107276  132777  000100  106160                  BITB    #100,@ML.REG+60
107304  001401                                  BEQ     11$
107306  005200                                  INC     R0
107310  020026                          11$:    CMP     R0,(SP)+
107312  001002                                  BNE     12$
107314  005726                                  TST     (SP)+
107316  000425                                  BR      13$
107320  005726                          12$:    TST     (SP)+
107322  104455                                  TRAP    55                      ;                                       1070
107324  000173                                  .WORD   173
107326  012706                                  .WORD   ASYNC
107330  026302                                  .WORD   DUMPER
107332  012746  010664                          MOV     #WRD.14,-(SP)           ;                                       1070
107336  012746  011474                          MOV     #WRD.69,-(SP)
107342  012746  010630                          MOV     #WRD.10,-(SP)
107346  012746  011462                          MOV     #WRD.67,-(SP)
107352  012746  010270                          MOV     #FOR.FMT,-(SP)
107356  012746  000005                          MOV     #5,-(SP)
107362  010600                                  MOV     SP,R0                   ; SP,*
107364  104414                                  TRAP    14
107366  062706  000014                          ADD     #14,SP                  ;                                       1070
107372  020327  000001                  13$:    CMP     R3,#1                   ; ERR.FLG,*                             1070
107376  001062                                  BNE     14$
107400  104455                                  TRAP    55                      ;                                       1071
107402  000174                                  .WORD   174
107404  012750                                  .WORD   SYNC
107406  026302                                  .WORD   DUMPER
107410  012746  012020                          MOV     #PHR.11,-(SP)           ;                                       1071
107414  012746  011310                          MOV     #WRD.52,-(SP)
107420  012746  012620                          MOV     #REG.14,-(SP)
107424  012746  010256                          MOV     #THR.FMT,-(SP)
107430  012746  000004                          MOV     #4,-(SP)
107434  010600                                  MOV     SP,R0                   ; SP,*
107436  104414                                  TRAP    14
107440  017716  106150                          MOV     @ML.REG+210,(SP)        ;                                       1071
107444  011146                                  MOV     (R1),-(SP)
107446  012746  006442                          MOV     #FMT.1,-(SP)
107452  012746  000003                          MOV     #3,-(SP)
107456  010600                                  MOV     SP,R0                   ; SP,*
107460  104414                                  TRAP    14
107462  011200                                  MOV     (R2),R0                 ;                                       1071
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

107464  006200                                  ASR     R0
107466  006200                                  ASR     R0
107470  006200                                  ASR     R0
107472  006200                                  ASR     R0
107474  006200                                  ASR     R0
107476  006200                                  ASR     R0
107500  042700  177700                          BIC     #177700,R0
107504  010016                                  MOV     R0,(SP)
107506  111246                                  MOVB    (R2),-(SP)
107510  042716  177700                          BIC     #177700,(SP)
107514  116546  015770                          MOVB    DT.1+4(R5),-(SP)
107520  042716  177700                          BIC     #177700,(SP)
107524  012746  007632                          MOV     #FMT.19,-(SP)
107530  012746  000004                          MOV     #4,-(SP)
107534  010600                                  MOV     SP,R0                   ; SP,*
107536  104414                                  TRAP    14
107540  062706  000030                          ADD     #30,SP                  ;                                       1071
107544  104467                          14$:    TRAP    67                      ;                                       1071
107546  006000                                  ROR     R0
107550  103002                                  BHIS    15$
107552  000167  177156                          JMP     3$
107556  022626                          15$:    CMP     (SP)+,(SP)+             ;                                       1065
107560  005204                                  INC     R4                      ; LATCH.LOOP                            1065
107562  020466  000004                  16$:    CMP     R4,4(SP)                ; LATCH.LOOP,FINISH
107566  003002                                  BGT     17$
107570  000167  177110                          JMP     2$
107574  152777  000040  105642          17$:    BISB    #40,@ML.REG+40          ;                                       1071
107602  016705  106224                          MOV     ML.DUT,R5
107606  042705  177770                          BIC     #177770,R5
107612  142777  000007  105624                  [illegible]     #7,@ML.REG+40
107620  150577  105620                          [illegible]     R5,@ML.REG+40
107624  005777  105764                          [illegible]     @ML.REG+210             ;                                       1072
107630  001424                                  BEQ     18$
107632  104455                                  TRAP    55                      ;                                       1072
107634  000175                                  .WORD   175
107636  012750                                  .WORD   SYNC
107640  026302                                  .WORD   DUMPER
107642  012746  010664                          MOV     #WRD.14,-(SP)           ;                                       1072
107646  012746  012234                          MOV     #FNC.7,-(SP)
107652  012746  011310                          MOV     #WRD.52,-(SP)
107656  012746  012620                          MOV     #REG.14,-(SP)
107662  012746  010270                          MOV     #FOR.FMT,-(SP)
107666  012746  000005                          MOV     #5,-(SP)
107672  010600                                  MOV     SP,R0                   ; SP,*
107674  104414                                  TRAP    14
107676  062706  000014                          ADD     #14,SP                  ;                                       1072
107702  152777  000001  105614          18$:    BISB    #1,@ML.REG+120          ;                                       1073
107710  005066  000004                          CLR     4(SP)                   ; FINISH                                1073
107714  005266  000002                          INC     2(SP)                   ; CLR.LOOP                              1065
107720  026627  000002  000001                  CMP     2(SP),#1                ; CLR.LOOP,*
107726  003002                                  BGT     19$
107730  000167  176742                          JMP     1$
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
                                
107734  062706  000006        19$:    ADD     #6,SP                   ;                               1060
107740  000207                  RTS     PC
                                
                                ; Routine Size:  294 words
                                ; Maximum stack depth per invocation:  23 words
                                
                                
                                
                                        .SBTTL  T56 TEST CODE SECTION
107742                          T56::
107742  004767  176660          1$:     JSR     PC,$T56                 ;               1073
107746  104466                  TRAP    66
107750  006000                  ROR     R0
107752  103773                  BLO     1$
107754  000207                  RTS     PC
                                
                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
                                
                                
;       10735 !<BLF/PAGE>
```

```
;ML4AD
;                TEST CODE SECTION

                10736 !
                10737 BGNTST;
                10738
                10739 !++
                10740 ! TEST NUMBER:  TST 57
                10741 !
                10742 ! TEST NAME:              ECC ERROR LOCATION REGISTER TEST
                10743 !
                10744 ! TEST DESCRIPTION:
                10745 !       TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS
                10746 !       CLEARING AND LATCHING OF DSA ADDRESSES ON DETECTION OF ECC ERROR BY:
                10747 !
                10748 !       1.  TEST FOR CLOCKING BY:
                10749 !           A. DO A MASS BUS CLEAR FORCING REGISTER BITS TO ZEROES
                10750 !           B. FORCE AN ECC ERROR AT THE LAST BLOCK AND DO A READ TRANSFER
                10751 !           C. CHECK MLEL FOR LAST BLOCK ADDRESS
                10752 !
                10753 !       2.  TEST FOR BIT UNIQUENESS BY:
                10754 !           A. WITH FORCED ECC ERRORS DO READ TRANSFERS AT VARIOUS DSA
                10755 !              ADDRESSES AND CHECK MLEL FOR LATCHED DSA ADDRESSES
                10756 !           B. DO CLEAR AND REPEAT
                10757 !
                10758 !       3.  TEST FOR LATCHING AND CLEARING BY:
                10759 !           A. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
                10760 !              LAST BLOCK. (LATCHES MLEL WITH THE LAST BLOCK ADDRESS TO START THE TEST OFF)
                10761 !           B. AGAIN WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT DSA
                10762 !              ZERO AND CHECK MLEL FOR NOT LATCHING.
                10763 !              NO CLEAR DONE
                10764 !           C. WITH FORCED UNCORRECTABLE ERRORS DO A READ TRANSFER AT DSA
                10765 !              ZERO  CHECK MLEL FOR LATCHED DSA ZERO
                10766 !              NO CLEAR DONE
                10767 !           D. WITH FORCED SINGLE BIT ERRORS DO A READ TRANSFER AT THE LAST
                10768 !              BLOCK AND CHECK MLEL FOR NOT LATCHING
                10769 !              NO CLEAR DONE
                10770 !           E. WITH A FORCED UNCORRECTABLE ERROR DO A READ TRANSFER AT
                10771 !              THE LAST BLOCK AN CHECK MLEL FOR NOT LATCHING
                10772 !           F. DO A MASS BUS CLEAR
                10773 !           G. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
                10774 !              LAST BLOCK
                10775 !           H. DO A MASS BUS CLEAR AGAIN AND CHECK MLEL FOR ZEROES
                10776 !
                10777 ! IMPLICIT INPUTS:
                10778 !       IO_BUF
                10779 !       A  VECTOR OF 256 WORDS WHERE DATA
                10780 !       FOR MBUS READS AND WRITES TRANSFERS
                10781 !       IS FOUND.
                10782 !
                10783 !
                10784 !--
                10785
                10786 local
                10787     SGL,                                  !SINGLE BIT ERROR PARRAMETER
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)

;          10788     UNC,                                !UNCORRECTABLE ERR PARRAMETER
;          10789     SAVE,                               !TEMPORY SAVE LOCATION
;          10790     SHF_DATA,                           !SHIFTING DATA PATTERN SAVE LOCATION
;          10791     DSA_PAT;                            !EXPECTED DSA PATTERN LATCHED IN MLEL
;          10792
;          10793 CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
;          10794 BGNSUB;                                 !START OF SCOPE LOOP
;          10795 CLR_MBUS;                               !CLEAR THE MLEL REGISTER
;          10796 FOR_ECC_ERR (SGL = 1, UNC = 0);         !FORCE A SBE
;          10797 MLDA = .LST_BLK;                        !LATCH THE LAST BLK ADRS INTO THE MLEL
;          10798 MLWC = not 255;
;          10799 MLBA = IO_BUF;
;          10800 MLCS1 = read;                           !DO A READ AND LATCH THE MLEL
;          10801 TIME_OUT_LOOP;
;          10802
;          10803 if .MLEL eql ZEROES                     !SEE IF THE MLEL GOT CLOCKED
;          10804 then
;          10805     begin                               !REPORT AN ERROR IF NOT CLOCKED
;          10806     ERRDF (126, SYNC, DUMPER);
;          10807     PRINTB (THR_FMT, REG_15, WRD_52, PHR_11);
;          10808     EXIT_TST;
;          10809     end;
;          10810
;          10811 ENDSUB;                                 !END OF SCOPE LOOP
;          10812 SHF_DATA = .LST_ARR;                    !LOAD  THE SHIFT DATA
;          10813
;          10814 incr LOOP from 0 to 16 do               !FIRST TEST FOR 1'S AND 0'S THEN SHIFT DATA
;          10815     begin
;          10816     BGNSUB;                             !START OF SCOPE LOOP
;          10817     CLR_MBUS;                           !CLEAR THE DRIVE
;          10818     FOR_ECC_ERR (SGL = 1, UNC = 0);     !FORCE A SBE
;          10819
;          10820     selectone .LOOP of                  !SELECT THE TEST PATTERN
;          10821         set
;          10822
;          10823         [0] :                           !ZEROES PATTERN
;          10824             begin
;          10825             DSA_PAT = ZEROES;
;          10826             MLDA = .DSA_PAT;
;          10827             end;
;          10828
;          10829         [1] :                           !MOSTLY ONES PATTERN
;          10830             begin
;          10831             DSA_PAT = .LST_BLK;
;          10832             MLDA = .DSA_PAT;
;          10833             end;
;          10834
;          10835         [otherwise] :                   !SHIFT PATTERN
;          10836             begin
;          10837             DSA_PAT = .SHF_DATA;
;          10838             MLDA = .SHF_DATA;
;          10839             SHF_DATA = .SHF_DATA^-ONE;
```

```
10840              end;
10841          tes;
10842
10843      MLWC = not 255;                          !SET UP THE TRANSFER
10844      MLBA = IO_BUF;
10845      MLCS1 = read;                            !DO THE TRANSFER AND LATCH MLEL
10846      TIME_OUT_LOOP;
10847      SAVE = .MLEL;                            !READ AND SAVE THE MLEL REGISTER
10848
10849      if .SAVE neq .DSA_PAT                    !SEE IF SAVE IS WHAT WE EXPECTED
10850      then
10851          begin                                !REPORT AN ERROR IF NOT THE SAME
10852          CMP_THRESHOLD;                       !COMPARE ERROR PRINT THRESHOLD
10853          ERRDF (127, ASYNC, DUMPER);
10854          PRINTB (TWO_FMT, REG_15, PHR_4);
10855          PRINTB (FMT_2, .DSA_PAT, .SAVE, (.DSA_PAT xor .SAVE));
10856          end;
10857
10858      ENDSUB;                                  !END OF SCOPE LOOP
10859      end;
10860
10861  CLR_MBUS;                                    !CLEAR THE DRIVE
10862  FOR_ECC_ERR (SGL = 1, UNC = 0);              !FORCE A SBE
10863  MLWC = not 255;                              !SET UP A LAST BLOCK TRANSFER
10864  MLBA = IO_BUF;                               !TO LATCH THE MLEL WITH T
10865  MLDA = .LST_BLK;
10866  MLCS1 = read;
10867  TIME_OUT_LOOP;
10868
10869  incr LOOP from 0 to 4 do                     !NOW TEST FOR CORRECT LATCHING
10870      begin
10871      BGNSUB;                                  !START OF SCOPE LOOP
10872      MLER = ZEROES;                           !CLEAR THE ERROR REGISTER
10873
10874      case .LOOP from 0 to 4 of                !SELECT TEST DATA
10875          set
10876
10877          [0] :                                !FORCE A SBE AND CHECK FOR THE LST BLK ADRS
10878              begin
10879              SGL = 1;
10880              UNC = 0;
10881              DSA_PAT = .LST_BLK;
10882              MLDA = ZEROES;
10883              end;
10884
10885          [1] :                                !FORCE A UNC ERROR AND CHECK FOR ADRS ZERO
10886              begin
10887              SGL = 0;
10888              UNC = 1;
10889              DSA_PAT = ZEROES;
10890              MLDA = ZEROES;
10891              end;
```

```
25090 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
25091 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)
25092 ;
25093 ;          10892
25094 ;          10893          [2] :                            !FORCE SBE AND CHECK FOR ADRS ZERO
25095 ;          10894              begin
25096 ;          10895              SGL = 1;
25097 ;          10896              UNC = 0;
25098 ;          10897              DSA_PAT = ZEROES;
25099 ;          10898              MLDA = .LST_BLK;
25100 ;          10899              end;
25101 ;          10900
25102 ;          10901          [3] :                            !FORCE UNC ERROR AND CHECK FOR ADRS ZERO
25103 ;          10902              begin
25104 ;          10903              SGL = 0;
25105 ;          10904              UNC = 1;
25106 ;          10905              DSA_PAT = ZEROES;
25107 ;          10906              MLDA = .LST_BLK;
25108 ;          10907              end;
25109 ;          10908
25110 ;          10909          [4] :                            !FORCE SBE AND CHECK FOR ADRS ZERO
25111 ;          10910              begin
25112 ;          10911              CLR_MBUS;
25113 ;          10912              SGL = 1;
25114 ;          10913              UNC = 0;
25115 ;          10914              DSA_PAT = ZEROES;
25116 ;          10915              MLDA = .LST_BLK;
25117 ;          10916              end;
25118 ;          10917          tes;
25119 ;          10918
25120 ;          10919      FOR_ECC_ERR (.SGL, .UNC);            !FORCE SELECTED FORCED ERROR INTO ML11
25121 ;          10920      MLWC = not 255;                      !SET UP A TRANSFER
25122 ;          10921      MLBA = IO_BUF;
25123 ;          10922      MLCS1 = read;                        !READ THE ERROR OUT AND LATCH MLEL
25124 ;          10923      TIME_OUT_LOOP;
25125 ;          10924
25126 ;          10925      if .LOOP neq 4                       !TEST THE REG FOR LATCH DATA IF LOOP NEQ 4
25127 ;          10926      then
25128 ;          10927          SAVE = .MLEL
25129 ;          10928      else
25130 ;          10929          begin                            !ELSE TEST THE REG FOR CLEAR
25131 ;          10930          CLR_MBUS;
25132 ;          10931          SAVE = .MLEL;
25133 ;          10932          end;
25134 ;          10933
25135 ;          10934      if .SAVE neq .DSA_PAT                !SEE IF THE REG LATCHED  OK
25136 ;          10935      then
25137 ;          10936          begin                            !REPORT ERROR IF NOT LATCHED
25138 ;          10937          CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
25139 ;          10938          ERRDF (128, SYNC, DUMPER);
25140 ;          10939          PRINTB (THR_FMT, REG_15, WRD_71, WRD_10);
25141 ;          10940          PRINTB (FMT_1, .DSA_PAT, .SAVE)
25142 ;          10941          end;
25143 ;          10942
25144 ;          10943      ENDSUB;                              !END OF SCOPE LOOP
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)

;          10944     end;
;          10945
;          10946 ENDTST;

                                        .SBTTL  $T57 TEST CODE SECTION
107756  004167  074630          $T57:   JSR     R1,$SAVE5                       ;                       1073
107762  005746                          TST     -(SP)
107764  005067  105406                  CLR     P.CNT                           ;                       1079
107770  104402                  1$:     TRAP    2                               ;                       1079
107772  152777  000040  105444          BISB    #40,@ML.REG+40                  ;                       1079
110000  016705  106026                  MOV     ML.DUT,R5
110004  042705  177770                  BIC     #177770,R5
110010  142777  000007  105426          BICB    #7,@ML.REG+40
110016  150577  105422                  BISB    R5,@ML.REG+40
110022  012703  000001                  MOV     #1,R3                           ; *,SGL                 1079
110026  010346                          MOV     R3,-(SP)                        ; SGL,*
110030  005001                          CLR     R1                              ; UNC
110032  005046                          CLR     -(SP)
110034  004767  110150                  JSR     PC,FOR.ECC.ERR
110040  016777  103750  105366          MOV     LST.BLK,@ML.REG+30              ;                       1079
110046  012777  177400  105340          MOV     #-400,@ML.REG+10                ;                       1079
110054  012777  014022  105342          MOV     #IO.BUF,@ML.REG+20              ;                       1079
110062  012777  000071  105314          MOV     #71,@ML.REG                     ;                       1080
110070  105777  105360          2$:     TSTB    @ML.REG+50
110074  100375                          BPL     2$
110076  005777  105522                  TST     @ML.REG+220                     ;                       1080
110102  001025                          BNE     3$
110104  104455                          TRAP    55                              ;                       1080
110106  000176                          .WORD   176
110110  012750                          .WORD   SYNC
110112  026302                          .WORD   DUMPER
110114  012746  012020                  MOV     #PHR.11,-(SP)                   ;                       1080
110120  012746  011310                  MOV     #WRD.52,-(SP)
110124  012746  012626                  MOV     #REG.15,-(SP)
110130  012746  010256                  MOV     #THR.FMT,-(SP)
110134  012746  000004                  MOV     #4,-(SP)
110140  010600                          MOV     SP,R0                           ; SP,*
110142  104414                          TRAP    14
110144  104463                          TRAP    63
110146  062706  000016                  ADD     #16,SP                          ;                       1080
110152  000167  001052                  JMP     31$                             ;                       1080
110156  022626                  3$:     CMP     (SP)+,(SP)+                     ;                       1079
110160  104467                          TRAP    67                              ;                       1080
110162  006000                          ROR     R0
110164  103701                          BLO     1$
110166  016705  103626                  MOV     LST.ARR,R5                      ; *,SHF.DATA            1081
```

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25202                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
25203                                   ;       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<
25204
25205 110172  005002                    4$:     CLR     R2                      ; LOOP                          1081
25206 110174  104402                            TRAP    2                       ;                               1081
25207 110176  152777  000040  105240            BISB    #40,@ML.REG+40          ;                               1081
25208 110204  016700  105622                    MOV     ML.DUT,R0
25209 110210  042700  177770                    BIC     #177770,R0
25210 110214  142777  000007  105222            BICB    #7,@ML.REG+40
25211 110222  150077  105216                    BISB    R0,@ML.REG+40
25212 110226  012703  000001                    MOV     #1,R3                   ; *,SGL                         1081
25213 110232  010346                            MOV     R3,-(SP)                ; SGL,*
25214 110234  005001                            CLR     R1                      ; UNC
25215 110236  005046                            CLR     -(SP)
25216 110240  004767  107744                    JSR     PC,FOR.ECC.ERR
25217 110244  005702                            TST     R2                      ; LOOP                          1082
25218 110246  001002                            BNE     5$
25219 110250  005004                            CLR     R4                      ; DSA.PAT                       1082
25220 110252  000405                            BR      6$                      ;                               1082
25221 110254  020227  000001            5$:     CMP     R2,#1                   ; LOOP,*                        1082
25222 110260  001005                            BNE     7$
25223 110262  016704  103526                    MOV     LST.BLK,R4              ; *,DSA.PAT                     1083
25224 110266  010477  105142            6$:     MOV     R4,@ML.REG+30           ; DSA.PAT,*                     1083
25225 110272  000404                            BR      8$                      ;                               1082
25226 110274  010504                    7$:     MOV     R5,R4                   ; SHF.DATA,DSA.PAT              1083
25227 110276  010577  105132                    MOV     R5,@ML.REG+30           ; SHF.DATA,*                    1083
25228 110302  006205                            ASR     R5                      ; SHF.DATA                      1083
25229 110304  012777  177400  105102    8$:     MOV     #-400,@ML.REG+10        ;                               1084
25230 110312  012777  014022  105104            MOV     #IO.BUF,@ML.REG+20      ;                               1084
25231 110320  012777  000071  105056            MOV     #71,@ML.REG             ;                               1084
25232 110326  105777  105122            9$:     TSTB    @ML.REG+50
25233 110332  100375                            BPL     9$
25234 110334  017766  105264  000004            MOV     @ML.REG+220,4(SP)       ; *,SAVE                        1084
25235 110342  026604  000004                    CMP     4(SP),R4                ; SAVE,DSA.PAT                  1084
25236 110346  001451                            BEQ     11$
25237 110350  005267  105022                    INC     P.CNT                   ;                               1085
25238 110354  026767  105016  105016            CMP     P.CNT,LIMIT
25239 110362  003402                            BLE     10$
25240 110364  022626                            CMP     (SP)+,(SP)+
25241 110366  000445                            BR      12$
25242 110370  104455                    10$:    TRAP    55                      ;                               1085
25243 110372  000177                            .WORD   177
25244 110374  012706                            .WORD   ASYNC
25245 110376  026302                            .WORD   DUMPER
25246 110400  012746  011676                    MOV     #PHR.4,-(SP)            ;                               1085
25247 110404  012746  012626                    MOV     #REG.15,-(SP)
25248 110410  012746  010246                    MOV     #TWO.FMT,-(SP)
25249 110414  012746  000003                    MOV     #3,-(SP)
25250 110420  010600                            MOV     SP,R0                   ; SP,*
25251 110422  104414                            TRAP    14
25252 110424  016616  000014                    MOV     14(SP),(SP)             ; SAVE,*                        1085
25253 110430  010446                            MOV     R4,-(SP)                ; DSA.PAT,*
25254 110432  046616  000002                    BIC     2(SP),(SP)
25255 110436  040466  000002                    BIC     R4,2(SP)                ; DSA.PAT,*
25256 110442  052616                            BIS     (SP)+,(SP)
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

110444  016646  000014                          MOV     14(SP),-(SP)                    ; SAVE,*
110450  010446                                  MOV     R4,-(SP)                        ; DSA.PAT,*
110452  012746  006506                          MOV     #FMT.2,-(SP)
110456  012746  000004                          MOV     #4,-(SP)
110462  010600                                  MOV     SP,R0                           ; SP,*
110464  104414                                  TRAP    14
110466  062706  000020                          ADD     #20,SP                          ;                                       1085
110472  022626                          11$:    CMP     (SP)+,(SP)+                     ;                                       1081
110474  104467                                  TRAP    67                              ;                                       1085
110476  006000                                  ROR     R0
110500  103635                                  BLO     4$
110502  005202                          12$:    INC     R2                              ; LOOP                                  1081
110504  020227  000020                          CMP     R2,#20                          ; LOOP,*
110510  003631                                  BLE     4$
110512  152777  000040  104724                  BISB    #40,@ML.REG+40                  ;                                       1085
110520  016705  105306                          MOV     ML.DUT,R5
110524  042705  177770                          BIC     #177770,R5
110530  142777  000007  104706                  BICB    #7,@ML.REG+40
110536  150577  104702                          BISB    R5,@ML.REG+40
110542  012703  000001                          MOV     #1,R3                           ; *,SGL                                 1086
110546  010346                                  MOV     R3,-(SP)                        ; SGL,*
110550  005001                                  CLR     R1                              ; UNC
110552  005046                                  CLR     -(SP)
110554  004767  107430                          JSR     PC,FOR.ECC.ERR
110560  012777  177400  104626                  MOV     #-400,@ML.REG+10                ;                                       1086
110566  012777  014022  104630                  MOV     #IO.BUF,@ML.REG+20              ;                                       1086
110574  016777  103214  104632                  MOV     LST.BLK,@ML.REG+30              ;                                       1086
110602  012777  000071  104574                  MOV     #71,@ML.REG                     ;                                       1086
110610  105777  104640                  13$:    TSTB    @ML.REG+50
110614  100375                                  BPL     13$
110616  005002                                  CLR     R2                              ; LOOP                                  1086
110620  104402                          14$:    TRAP    2                               ;                                       1087
110622  005077  104636                          CLR     @ML.REG+60                      ;                                       1087
110626  010205                                  MOV     R2,R5                           ; LOOP,*                                1087
110630  006305                                  ASL     R5
110632  066507  110636                          ADD     15$(R5),PC
110636  000012                          15$:    .WORD   16$-15$
110640  000026                                  .WORD   17$-15$
110642  000044                                  .WORD   19$-15$
110644  000046                                  .WORD   20$-15$
110646  000056                                  .WORD   21$-15$
110650  012703  000001                  16$:    MOV     #1,R3                           ; *,SGL                                 1087
110654  005001                                  CLR     R1                              ; UNC                                   1088
110656  016704  103132                          MOV     LST.BLK,R4                      ; *,DSA.PAT                             1088
110662  000404                                  BR      18$                             ;                                       1088
110664  005003                          17$:    CLR     R3                              ; SGL                                   1088
110666  012701  000001                          MOV     #1,R1                           ; *,UNC                                 1088
110672  005004                                  CLR     R4                              ; DSA.PAT                               1088
110674  005077  104534                  18$:    CLR     @ML.REG+30                      ;                                       1089
110700  000430                                  BR      24$                             ;                                       1087
110702  000420                          19$:    BR      22$                             ;                                       1089
110704  005003                          20$:    CLR     R3                              ; SGL                                   1090
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

110706  012701  000001                          MOV     #1,R1                           ; *,UNC                         1090
110712  000417                                  BR      23$                             ;                               1090
110714  152777  000040  104522  21$:            BISB    #40,@ML.REG+40                  ;                               1091
110722  016705  105104                          MOV     ML.DUT,R5
110726  042705  177770                          BIC     #177770,R5
110732  142777  000007  104504                  BICB    #7,@ML.REG+40
110740  150577  104500                          BISB    R5,@ML.REG+40
110744  012703  000001          22$:            MOV     #1,R3                           ; *,SGL                         1091
110750  005001                                  CLR     R1                              ; UNC                           1091
110752  005004                  23$:            CLR     R4                              ; DSA.PAT                       1091
110754  016777  103034  104452                  MOV     LST.BLK,@ML.REG+30              ;                               1091
110762  010346                  24$:            MOV     R3,-(SP)                        ; SGL,*                         1091
110764  010146                                  MOV     R1,-(SP)                        ; UNC,*
110766  004767  107216                          JSR     PC,FOR.ECC.ERR
110772  012777  177400  104414                  MOV     #-400,@ML.REG+10                ;                               1092
111000  012777  014022  104416                  MOV     #IO.BUF,@ML.REG+20              ;                               1092
111006  012777  000071  104370                  MOV     #71,@ML.REG                     ;                               1092
111014  105777  104434          25$:            TSTB    @ML.REG+50
111020  100375                                  BPL     25$
111022  020227  000004                          CMP     R2,#4                           ; LOOP,*                        1092
111026  001014                                  BNE     26$                             ;                               1092
111030  152777  000040  104406                  BISB    #40,@ML.REG+40                  ;                               1092
111036  016705  104770                          MOV     ML.DUT,R5
111042  042705  177770                          BIC     #177770,R5
111046  142777  000007  104370                  BICB    #7,@ML.REG+40
111054  150577  104364                          BISB    R5,@ML.REG+40
111060  017766  104540  000010  26$:            MOV     @ML.REG+220,10(SP)              ; *,SAVE                        1093
111066  026604  000010                          CMP     10(SP),R4                       ; SAVE,DSA.PAT                  1093
111072  001443                                  BEQ     28$
111074  005267  104276                          INC     P.CNT                           ;                               1093
111100  026767  104272  104272                  CMP     P.CNT,LIMIT
111106  003402                                  BLE     27$
111110  022626                                  CMP     (SP)+,(SP)+
111112  000437                                  BR      29$
111114  104455                  27$:            TRAP    55                              ;                               1093
111116  000200                                  .WORD   200
111120  012750                                  .WORD   SYNC
111122  026302                                  .WORD   DUMPER
111124  012746  010630                          MOV     #WRD.10,-(SP)                   ;                               1093
111130  012746  011514                          MOV     #WRD.71,-(SP)
111134  012746  012626                          MOV     #REG.15,-(SP)
111140  012746  010256                          MOV     #THR.FMT,-(SP)
111144  012746  000004                          MOV     #4,-(SP)
111150  010600                                  MOV     SP,R0                           ; SP,*
111152  104414                                  TRAP    14
111154  016616  000022                          MOV     22(SP),(SP)                     ; SAVE,*                        1094
111160  010446                                  MOV     R4,-(SP)                        ; DSA.PAT,*
111162  012746  006442                          MOV     #FMT.1,-(SP)
111166  012746  000003                          MOV     #3,-(SP)
111172  010600                                  MOV     SP,R0                           ; SP,*
111174  104414                                  TRAP    14
111176  062706  000020                          ADD     #20,SP                          ;                               1093
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

111202  022626                          28$:    CMP     (SP)+,(SP)+                     ;                                1087
111204  104467                                  TRAP    67                              ;                                1094
111206  006000                                  ROR     R0
111210  103603                                  BLO     14$
111212  005202                          29$:    INC     R2                              ; LOOP                           1086
111214  020227  000004                          CMP     R2,#4                           ; LOOP,*
111220  003002                                  BGT     30$
111222  000167  177372                          JMP     14$
111226  022626                          30$:    CMP     (SP)+,(SP)+                     ;                                1073
111230  005726                          31$:    TST     (SP)+
111232  000207                                  RTS     PC

                                        ; Routine Size:  343 words
                                        ; Maximum stack depth per invocation:  19 words



                                                .SBTTL  T57 TEST CODE SECTION
111234                                  T57::
111234  004767  176516                  1$:     JSR     PC,$T57                         ;                                1094
111240  104466                                  TRAP    66
111242  006000                                  ROR     R0
111244  103773                                  BLO     1$
111246  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          10947 !<BLF/PAGE>
```

```
25418 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
25419 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (110)
25420 ;
25421 ;          10948 !
25422 ;          10949 BGNTST;
25423 ;          10950
25424 ;          10951 !++
25425 ;          10952 ! TEST NUMBER:  TST 58
25426 ;          10953 !
25427 ;          10954 ! TEST NAME:            ECC HARD ERROR BIT TEST
25428 ;          10955 !
25429 ;          10956 ! TEST DESCRIPTION:
25430 ;          10957 !       VIA ECC_DM AND ECC_DIS TEST THE
25431 ;          10958 !       ECH BIT FOR SETTING AND NOT SETTING BY:
25432 ;          10959 !
25433 ;          10960 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
25434 ;          10961 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
25435 ;          10962 !
25436 ;          10963 !       2.  WITH ECC_DM = 0 AND ECC_DIS = 0
25437 ;          10964 !           DO A READ TRANSFER AND CHECK ECH SET
25438 ;          10965 !
25439 ;          10966 !       3.  WITH ECC_DM = 0 AND ECC_DIS = 1
25440 ;          10967 !           DO A READ TRANSFER AND CHECK ECH NOT SET
25441 ;          10968 !
25442 ;          10969 ! IMPLICIT INPUTS:
25443 ;          10970 !       IO_BUF
25444 ;          10971 !       A  VECTOR OF 256 WORDS WHERE DATA
25445 ;          10972 !       FOR MBUS READS AND WRITES TRANSFERS
25446 ;          10973 !       IS FOUND.
25447 ;          10974 !
25448 ;          10975 !
25449 ;          10976 !--
25450 ;          10977
25451 ;          10978 local
25452 ;          10979     EXPECTED;                             !EXPECTED ECH_ERR VALUE
25453 ;          10980
25454 ;          10981 CLR_MBUS;                                 !CLEAR THE DRIVE
25455 ;          10982 ECC_DM = ONE;                             !SET ECC DIAG MODE
25456 ;          10983 PAR_CRC_WRD = ZEROES;                     !FORCE UNCORRECTABLE ERRORS INTO THE GOOD BLOCK
25457 ;          10984 CRC_A = ZEROES;
25458 ;          10985 CRC_B = ZEROES;
25459 ;          10986 BAI = ONE;
25460 ;          10987 IO_BUF = ONES;
25461 ;          10988 GD_BLK_XFER ();
25462 ;          10989 MLCS1 = write;
25463 ;          10990 TIME_OUT_LOOP;
25464 ;          10991
25465 ;          10992 incr LOOP from 0 to 1 do                  !TEST ECH BIT FOR SETTING / NOT SETTING
25466 ;          10993     begin
25467 ;          10994     BGNSUB;                               !START OF SCOPE LOOP
25468 ;          10995     CLR_MBUS;                             !CLEAR THE DRIVE
25469 ;          10996     GD_BLK_XFER ();                       !SET UP A GOOD BLOCK TRANSFER
25470 ;          10997
25471 ;          10998     if .LOOP eql ZERO                     !SELECT THE TEST DATA
25472 ;          10999     then
```

```
  25474 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
  25475 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI 4 (110)
  25476 ;
  25477 ;          11000          begin                           !EXPECT ECH BIT TO SET
  25478 ;          11001          ECC_DIS = 0;
  25479 ;          11002          EXPECTED = 1;
  25480 ;          11003          end
  25481 ;          11004      else
  25482 ;          11005          begin                           !EXPECT ECH BIT NOT TO SET
  25483 ;          11006          ECC_DIS = 1;
  25484 ;          11007          EXPECTED = 0;
  25485 ;          11008          end;
  25486 ;          11009
  25487 ;          11010      MLCS1 = read;                       !READ THE ERROR OUT
  25488 ;          11011      TIME_OUT_LOOP;
  25489 ;          11012
  25490 ;          11013      if .ECH_ERR neq .EXPECTED           !IS ECH BIT WHAT WE EXPECTED
  25491 ;          11014      then
  25492 ;          11015          begin                           !ERROR IF NOT
  25493 ;          11016          ERRDF (129, SYNC, DUMPER);
  25494 ;          11017          PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
  25495 ;          11018          PRINTB (FMT_1, .EXPECTED, .ECH_ERR);
  25496 ;          11019          end;
  25497 ;          11020
  25498 ;          11021      ENDSUB;                             !END OF SCOPE LOOP
  25499 ;          11022      end;
  25500 ;          11023
  25501 ;          11024 ENDTST;
  25505
  25506                                          .SBTTL  $T58 TEST CODE SECTION
  25510 111250  004167  073300          $T58:   JSR     R1,$SAVE3                       ;                       1094
  25511 111254  152777  000040  104162          BISB    #40,@ML.REG+40                  ;                       1097
  25512 111262  016702  104544                  MOV     ML.DUT,R2
  25513 111266  042702  177770                  BIC     #177770,R2
  25514 111272  142777  000007  104144          BICB    #7,@ML.REG+40
  25515 111300  150277  104140                  BISB    R2,@ML.REG+40
  25516 111304  152777  000001  104212          BISB    #1,@ML.REG+120                  ;                       1098
  25517 111312  042777  037400  104234          BIC     #37400,@ML.REG+150              ;                       1098
  25518 111320  142777  000077  104226          BICB    #77,@ML.REG+150                 ;                       1098
  25519 111326  142777  000077  104230          BICB    #77,@ML.REG+160                 ;                       1098
  25520 111334  152777  000010  104102          BISB    #10,@ML.REG+40                  ;                       1098
  25521 111342  012767  177777  102452          MOV     #-1,IO.BUF                      ;                       1098
  25522 111350  004767  106736                  JSR     PC,GD.BLK.XFER                  ;                       1098
  25523 111354  012777  000061  104022          MOV     #61,@ML.REG                     ;                       1098
  25524 111362  105777  104066          1$:     TSTB    @ML.REG+50
  25525 111366  100375                  BPL     1$                                      ; LOOP                  1099
  25526 111370  005001                  CLR     R1                                      ;                       1099
  25527 111372  104402          2$:     TRAP    2                                       ;                       1099
  25528 111374  152777  000040  104042          BISB    #40,@ML.REG+40                  ;
```

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                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

111402  016700  104424                          MOV     ML.DUT,R0
111406  042700  177770                          BIC     #177770,R0
111412  142777  000007  104024                  BICB    #7,@ML.REG+40
111420  150077  104020                          BISB    R0,@ML.REG+40
111424  004767  106662                          JSR     PC,GD.BLK.XFER                  ;                                       1099
111430  005701                                  TST     R1                              ; LOOP                                  1099
111432  001006                                  BNE     3$
111434  142777  000002  104062                  BICB    #2,@ML.REG+120                  ;                                       1100
111442  012702  000001                          MOV     #1,R2                           ; *,EXPECTED                            1100
111446  000404                                  BR      4$                              ;                                       1099
111450  152777  000002  104046  3$:             BISB    #2,@ML.REG+120                  ;                                       1100
111456  005002                                  CLR     R2                              ; EXPECTED                              1100
111460  012777  000071  103716  4$:             MOV     #71,@ML.REG                     ;                                       1101
111466  105777  103762          5$:             TSTB    @ML.REG+50
111472  100375                                  BPL     5$
111474  010203                                  MOV     R2,R3                           ; EXPECTED,*                            1101
111476  005000                                  CLR     R0
111500  132777  000100  103756                  BITB    #100,@ML.REG+60
111506  001401                                  BEQ     6$
111510  005200                                  INC     R0
111512  020003                  6$:             CMP     R0,R3
111514  001441                                  BEQ     8$
111516  104455                                  TRAP    55                              ;                                       1101
111520  000201                                  .WORD   201
111522  012750                                  .WORD   SYNC
111524  026302                                  .WORD   DUMPER
111526  012746  010664                          MOV     #WRD.14,-(SP)                   ;                                       1101
111532  012746  011474                          MOV     #WRD.69,-(SP)
111536  012746  010630                          MOV     #WRD.10,-(SP)
111542  012746  011462                          MOV     #WRD.67,-(SP)
111546  012746  010270                          MOV     #FOR.FMT,-(SP)
111552  012746  000005                          MOV     #5,-(SP)
111556  010600                                  MOV     SP,R0                           ; SP,*
111560  104414                                  TRAP    14
111562  005016                                  CLR     (SP)                            ;                                       1101
111564  132777  000100  103672                  BITB    #100,@ML.REG+60
111572  001401                                  BEQ     7$
111574  005216                                  INC     (SP)
111576  010246                  7$:             MOV     R2,-(SP)                        ; EXPECTED,*
111600  012746  006442                          MOV     #FMT.1,-(SP)
111604  012746  000003                          MOV     #3,-(SP)
111610  010600                                  MOV     SP,R0                           ; SP,*
111612  104414                                  TRAP    14
111614  062706  000022                          ADD     #22,SP                          ;                                       1101
111620  104467                  8$:             TRAP    67                              ;                                       1101
111622  006000                                  ROR     R0
111624  103662                                  BLO     2$
111626  005201                                  INC     R1                              ; LOOP                                  1099
111630  020127  000001                          CMP     R1,#1                           ; LOOP,*
111634  003656                                  BLE     2$
111636  000207                                  RTS     PC                              ;                                       1094
```

```
25586                                   ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
25587                                   ;               TEST CODE SECTION       29-Mar-1982 16:21:03    PA:<
25588
25589                                   ; Routine Size:  124 words
25590                                   ; Maximum stack depth per invocation:  13 words
25595
25596
25600
25601                                           .SBTTL  T58 TEST CODE SECTION
25605 111640                            T58::
25606 111640  004767  177404            1$:     JSR     PC,$T58                 ;                       1102
25607 111644  104466                            TRAP    66
25608 111646  006000                            ROR     R0
25609 111650  103773                            BLO     1$
25610 111652  000207                            RTS     PC
25611
25612                                   ; Routine Size:  6 words
25613                                   ; Maximum stack depth per invocation:  0 words
25618
25619
25620 ;         11025 !<BLF/PAGE>
```

```
25622 ;ML4AD
25623 ;                 TEST CODE SECTION
25624 ;
25625 ;          11026 !
25626 ;          11027 BGNTST;
25627 ;          11028
25628 ;          11029 !++
25629 ;          11030 ! TEST NUMBER:  TST 59
25630 ;          11031 !
25631 ;          11032 ! TEST NAME:              DATA CHECK ERROR BIT TEST
25632 ;          11033 !
25633 ;          11034 ! TEST DESCRIPTION:
25634 ;          11035 !       VIA ECC_EN, ECC_DM AND ECC_DM TEST THE
25635 ;          11036 !       DCK BIT FOR SETTING AND NOT SETTING BY:
25636 ;          11037 !
25637 ;          11038 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
25638 ;          11039 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
25639 ;          11040 !
25640 ;          11041 !       2.  WITH DCK_EN = 1, ECC_DM = 0, ECC_DIS = 0
25641 ;          11042 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
25642 ;          11043 !
25643 ;          11044 !       3.  WITH DCK_EN = 0, ECC_DM = 0, ECC_DIS = 0
25644 ;          11045 !           DO A READ TRANSFER AND CHECK THE DCK BIT NOT SET
25645 ;          11046 !
25646 ;          11047 !       4.  WITH ECK_EN = 1, ECC_DM = 0, ECC_DIS = 1
25647 ;          11048 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
25648 ;          11049 !
25649 ;          11050 !
25650 ;          11051 ! IMPLICIT INPUTS:
25651 ;          11052 !       IO_BUF
25652 ;          11053 !       A  VECTOR OF 256 WORDS WHERE DATA
25653 ;          11054 !       FOR MBUS READS AND WRITES TRANSFERS
25654 ;          11055 !       IS FOUND.
25655 ;          11056 !
25656 ;          11057 !
25657 ;          11058 !--
25658 ;          11059
25659 ;          11060 local
25660 ;          11061     SGL,                          !SINGLE BIT ERROR PARRAMETER
25661 ;          11062     UNC,                          !UNCORRECTABLE ERROR PARRAMETER
25662 ;          11063     EXPECTED;                     !EXPECTED DATA CHECK BIT VALUE
25663 ;          11064
25664 ;          11065 CLR_MBUS;                         !CLEAR THE DRIVE
25665 ;          11066 FOR_ECC_ERR (SGL = 1, UNC = 0);   !FORCE  A SBE
25666 ;          11067 BAI = ONE;
25667 ;          11068 IO_BUF = ZEROES;
25668 ;          11069 GD_BLK_XFER ();                   !SET UP A GOOD BLOCK TRANSFER
25669 ;          11070 MLCS1 = write;                    !WRITE THE DRIVE WITH THE ERROR
25670 ;          11071 TIME_OUT_LOOP;
25671 ;          11072
25672 ;          11073 incr LOOP from 0 to 2 do          !TEST DCK BIT FOR 3 CONDITIONS
25673 ;          11074     begin
25674 ;          11075     BGNSUB;                       !START OF SCOPE LOOP
25675 ;          11076     CLR_MBUS;                     !CLEAR THE DRIVE
25676 ;          11077     GD_BLK_XFER ();               !SET UP A GOOD BLOCK TRANSFER
```

```
25678 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
25679 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (111)
25680
25681 ;          11078
25682 ;          11079      case .LOOP from 0 to 2 of                    !SELECT THE TEST DATA
25683 ;          11080          set
25684 ;          11081
25685 ;          11082          [0] :                                    !EXPECT THE DCK BIT TO SET
25686 ;          11083              begin
25687 ;          11084              DCK_EN = 1;
25688 ;          11085              ECC_DIS = 0;
25689 ;          11086              EXPECTED = 1;
25690 ;          11087              end;
25691 ;          11088
25692 ;          11089          [1] :                                    !EXPECT THE DCK BIT NOT TO SET
25693 ;          11090              begin
25694 ;          11091              DCK_EN = 0;
25695 ;          11092              ECC_DIS = 0;
25696 ;          11093              EXPECTED = 0;
25697 ;          11094              end;
25698 ;          11095
25699 ;          11096          [2] :                                    !EXPECT THE DCK BIT TO SET
25700 ;          11097              begin
25701 ;          11098              DCK_EN = 1;
25702 ;          11099              ECC_DIS = 1;
25703 ;          11100              EXPECTED = 1;
25704 ;          11101              end;
25705 ;          11102          tes;
25706 ;          11103
25707 ;          11104      MLCS1 = read;                                !READ THE ERROR AND CLOCK THE DCK BIT
25708 ;          11105      TIME_OUT_LOOP;
25709 ;          11106
25710 ;          11107      if .DCK neq .EXPECTED                        !IS THE DCK BIT WHAT WE EXPECTED
25711 ;          11108      then
25712 ;          11109          begin                                    !REPORT THE ERRRO IF NOT THE SAME
25713 ;          11110
25714 ;          11111          if .LOOP neq ONE then ERRDF (130, SYNC, DUMPER) else ERRDF (130, ASYNC, DUMPER);
25715 ;          11112
25716 ;          11113                                                   !CHOOSE WHICH THE ERROR IS ON
25717 ;          11114          PRINTB (THR_FMT, WRD_72, PHR_5, WRD_10);
25718 ;          11115          PRINTB (FMT_1, .EXPECTED, .DCK);
25719 ;          11116          end;
25720 ;          11117
25721 ;          11118      ENDSUB;                                      !END OF THE SCOPE LOOP
25722 ;          11119      end;
25723 ;          11120
25724 ;          11121 ENDTST;
25728
25729                                  .SBTTL  $T59 TEST CODE SECTION
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

111654  004167  072674                  $T59:   JSR     R1,$SAVE3                       ;                                1102
111660  152777  000040  103556                  BISB    #40,@ML.REG+40                  ;                                1106
111666  016702  104140                          MOV     ML.DUT,R2
111672  042702  177770                          BIC     #177770,R2
111676  142777  000007  103540                  BICB    #7,@ML.REG+40
111704  150277  103534                          BISB    R2,@ML.REG+40
111710  012701  000001                          MOV     #1,R1                           ; *,SGL                          1106
111714  010146                                  MOV     R1,-(SP)                        ; SGL,*
111716  005001                                  CLR     R1                              ; UNC
111720  005046                                  CLR     -(SP)
111722  004767  106262                          JSR     PC,FOR.ECC.ERR
111726  152777  000010  103510                  BISB    #10,@ML.REG+40                  ;                                1106
111734  005067  102062                          CLR     IO.BUF                          ;                                1106
111740  004767  106346                          JSR     PC,GD.BLK.XFER                  ;                                1106
111744  012777  000061  103432                  MOV     #61,@ML.REG                     ;                                1107
111752  105777  103476                  1$:     TSTB    @ML.REG+50
111756  100375                                  BPL     1$
111760  005001                                  CLR     R1                              ; LOOP                           1107
111762  104402                          2$:     TRAP    2                               ;                                1107
111764  152777  000040  103452                  BISB    #40,@ML.REG+40                  ;                                1107
111772  016700  104034                          MOV     ML.DUT,R0
111776  042700  177770                          BIC     #177770,R0
112002  142777  000007  103434                  BICB    #7,@ML.REG+40
112010  150077  103430                          BISB    R0,@ML.REG+40
112014  004767  106272                          JSR     PC,GD.BLK.XFER                  ;                                1107
112020  010100                                  MOV     R1,R0                           ; LOOP,*                         1107
112022  006300                                  ASL     R0
112024  066007  112030                          ADD     3$(R0),PC
112030  000006                          3$:     .WORD   4$-3$
112032  000024                                  .WORD   5$-3$
112034  000044                                  .WORD   6$-3$
112036  152777  000004  103460          4$:     BISB    #4,@ML.REG+120                  ;                                1108
112044  142777  000002  103452                  BICB    #2,@ML.REG+120                  ;                                1108
112052  000416                                  BR      7$                              ;                                1108
112054  142777  000004  103442          5$:     BICB    #4,@ML.REG+120                  ;                                1109
112062  142777  000002  103434                  BICB    #2,@ML.REG+120                  ;                                1109
112070  005002                                  CLR     R2                              ; EXPECTED                       1109
112072  000410                                  BR      8$                              ;                                1107
112074  152777  000004  103422          6$:     BISB    #4,@ML.REG+120                  ;                                1109
112102  152777  000002  103414                  BISB    #2,@ML.REG+120                  ;                                1109
112110  012702  000001                  7$:     MOV     #1,R2                           ; *,EXPECTED                     1110
112114  012777  000071  103262          8$:     MOV     #71,@ML.REG                     ;                                1110
112122  105777  103326                  9$:     TSTB    @ML.REG+50
112126  100375                                  BPL     9$
112130  010203                                  MOV     R2,R3                           ; EXPECTED,*                     1110
112132  005000                                  CLR     R0
112134  005777  103324                          TST     @ML.REG+60
112140  100001                                  BPL     10$
112142  005200                                  INC     R0
112144  020003                          10$:    CMP     R0,R3
112146  001446                                  BEQ     14$
112150  020127  000001                          CMP     R1,#1                           ; LOOP,*                         1111
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

112154  001405                                  BEQ     11$
112156  104455                                  TRAP    55
112160  000202                                  .WORD   202
112162  012750                                  .WORD   SYNC
112164  026302                                  .WORD   DUMPER
112166  000404                                  BR      12$
112170  104455                          11$:    TRAP    55
112172  000202                                  .WORD   202
112174  012706                                  .WORD   ASYNC
112176  026302                                  .WORD   DUMPER
112200  012746  010630                  12$:    MOV     #WRD.10,-(SP)                   ;                                       1111
112204  012746  011714                          MOV     #PHR.5,-(SP)
112210  012746  011524                          MOV     #WRD.72,-(SP)
112214  012746  010256                          MOV     #THR.FMT,-(SP)
112220  012746  000004                          MOV     #4,-(SP)
112224  010600                                  MOV     SP,R0                           ; SP,*
112226  104414                                  TRAP    14
112230  005016                                  CLR     (SP)                            ;                                       1111
112232  005777  103226                          TST     @ML.REG+60
112236  100001                                  BPL     13$
112240  005216                                  INC     (SP)
112242  010246                          13$:    MOV     R2,-(SP)                        ; EXPECTED,*
112244  012746  006442                          MOV     #FMT.1,-(SP)
112250  012746  000003                          MOV     #3,-(SP)
112254  010600                                  MOV     SP,R0                           ; SP,*
112256  104414                                  TRAP    14
112260  062706  000020                          ADD     #20,SP                          ;                                       1110
112264  104467                          14$:    TRAP    67                              ;                                       1111
112266  006000                                  ROR     R0
112270  103634                                  BLO     2$
112272  005201                                  INC     R1                              ; LOOP                                  1107
112274  020127  000002                          CMP     R1,#2                           ; LOOP,*
112300  003630                                  BLE     2$
112302  022626                                  CMP     (SP)+,(SP)+                     ;                                       1102
112304  000207                                  RTS     PC

                                        ; Routine Size:  141 words
                                        ; Maximum stack depth per invocation:  14 words



                                                .SBTTL  T59 TEST CODE SECTION
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<

                                T59::
112306                          1$:     JSR     PC,$T59                 ;                               1111
112306  004767  177342                  TRAP    66
112312  104466                          ROR     R0
112314  006000                          BLO     1$
112316  103773                          RTS     PC
112320  000207

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;       11122 !<BLF/PAGE>
```

```
25866 ;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
25867 ;                TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (112)
25868
25869 ;          11123 !
25870 ;          11124 BGNTST;
25871 ;          11125
25872 ;          11126 !++
25873 ;          11127 ! TEST NUMBER:  TST 60
25874 ;          11128 !
25875 ;          11129 ! TEST NAME:    PROM DATA TEST
25876 ;          11130 !
25877 ;          11131 ! TEST DESCRIPTION:
25878 ;          11132 !
25879 ;          11133 !       VERIFY THAT CHECK SUM VALUES FOR
25880 ;          11134 !       ALL PRESENT MEMORY ARRAY UV PROM
25881 ;          11135 !       LOCATIONS ARE ERROR FREE BY:
25882 ;          11136 !
25883 ;          11137 !       1.  DOING MBUS TRANSFERS
25884 ;          11138 !           AT ALL PRESENT BLOCKS
25885 ;          11139 !           AND TESTING THE UNS BIT
25886 ;          11140 !           TO BE CLEARED.
25887 ;          11141 !
25888 ;          11142 ! IMPLICIT INPUTS:
25889 ;          11143 !
25890 ;          11144 !       IO_BUF
25891 ;          11145 !
25892 ;          11146 !       A VECTOR OF 256 WORDS WHERE
25893 ;          11147 !       DATA FOR MBUS READ AND WRITE
25894 ;          11148 !       FUNCTIONS IS FOUND.
25895 ;          11149 !
25896 ;          11150 !
25897 ;          11151 !       CHIP_SIZ
25898 ;          11152 !       INDICATED THE SIZE OF THE
25899 ;          11153 !       ARRAY MODULES MOS RAMS.
25900 ;          11154 !
25901 ;          11155 !
25902 ;          11156 !--
25903 ;          11157
25904 ;          11158 CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
25905 ;          11159
25906 ;          11160 !
25907 ;          11161 !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
25908 ;          11162 !
25909 ;          11163 incrU DSA_CNT from 0 to .LST_BLK do     !WRITE TO ALL PRESENT BLK'S AND CHECK UNS BIT
25910 ;          11164     begin
25911 ;          11165     BGNSUB;
25912 ;          11166     CLR_MBUS;
25913 ;          11167     ECC_DIS = ONE;                     !DISABLE ECC
25914 ;          11168     MLWC = not 255;                    !LOAD WORD COUNT
25915 ;          11169     MLBA = IO_BUF;                     !LOAD UBUS ADRS
25916 ;          11170     MLDA = .DSA_CNT;                   !LOAD DSA
25917 ;          11171     MLCS1 = write;                     !DO A WRITE FUNCTION
25918 ;          11172     TIME_OUT_LOOP;
25919 ;          11173
25920 ;          11174     if .UNS IS_SET                     !SEE IF XFERR CAUSED AN UNS ERROR
```

```
25922 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
25923 ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD BLI.4 (112)
25924 ;
25925 ;         11175       then
25926 ;         11176           begin                           !ERROR IF SET
25927 ;         11177           CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
25928 ;         11178           ERRDF (107, ARR_DAT, DUMPER);
25929 ;         11179           PRINTB (TWO_FMT, WRD_35, PHR_4);
25930 ;         11180           PRINTB (FMT_9, .DSA_CNT);
25931 ;         11181
25932 ;         11182           if .CHIP_SIZ eql 64             !NEED TO KNOW CHIP SIZE TO PRINT ARRAY NUMBER
25933 ;         11183           then
25934 ;         11184               begin
25935 ;         11185               PRINTB (FMT_8, ((.DSA_CNT<11, 4>) + 1));    !64K MOS RAM
25936 ;         11186               end
25937 ;         11187           else
25938 ;         11188               begin
25939 ;         11189               PRINTB (FMT_8, ((.DSA_CNT<9, 4>) + 1));     !16K MOS RAM
25940 ;         11190               end
25941 ;         11191
25942 ;         11192           end;
25943 ;         11193
25944 ;         11194       ENDSUB;
25945 ;         11195       end;
25946 ;         11196
25947 ;         11197 ENDTST;
25951
25952                                         .SBTTL  $T60 TEST CODE SECTION
25956 112322  004167  072212          $T60:   JSR     R1,$SAVE2               ;                       1112
25957 112326  005067  103044                  CLR     P.CNT                   ;                       1112
25958 112332  016702  101456                  MOV     LST.BLK,R2              ;                       1116
25959 112336  005001                          CLR     R1                      ; DSA.CNT
25960 112340  000544                          BR      7$
25961 112342  104402                  1$:     TRAP    2                       ;                       1116
25962 112344  152777  000040  103072          BISB    #40,@ML.REG+40          ;                       1116
25963 112352  016700  103454                  MOV     ML.DUT,R0
25964 112356  042700  177770                  BIC     #177770,R0
25965 112362  142777  000007  103054          BICB    #7,@ML.REG+40
25966 112370  150077  103050                  BISB    R0,@ML.REG+40
25967 112374  152777  000002  103122          BISB    #2,@ML.REG+120          ;                       1116
25968 112402  012777  177400  103004          MOV     #-400,@ML.REG+10        ;                       1116
25969 112410  012777  014022  103006          MOV     #IO.BUF,@ML.REG+20      ;                       1116
25970 112416  010177  103012                  MOV     R1,@ML.REG+30           ; DSA.CNT,*             1117
25971 112422  012777  000061  102754          MOV     #61,@ML.REG             ;                       1117
25972 112430  105777  103020          2$:     TSTB    @ML.REG+50
25973 112434  100375                          BPL     2$
25974 112436  032777  040000  103020          BIT     #40000,@ML.REG+60       ;                       1117
25975 112444  001476                          BEQ     5$
25976 112446  005267  102724                  INC     P.CNT                   ;                       1117
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

112452  026767  102720  102720                CMP     P.CNT,LIMIT
112460  003073                                BGT     6$
112462  104455                                TRAP    55                      ;                                       1117
112464  000153                                .WORD   153
112466  013012                                .WORD   ARR.DAT
112470  026302                                .WORD   DUMPER
112472  012746  011676                        MOV     #PHR.4,-(SP)            ;                                       1117
112476  012746  011110                        MOV     #WRD.35,-(SP)
112502  012746  010246                        MOV     #TWO.FMT,-(SP)
112506  012746  000003                        MOV     #3,-(SP)
112512  010600                                MOV     SP,R0                   ; SP,*
112514  104414                                TRAP    14
112516  010116                                MOV     R1,(SP)                 ; DSA.CNT,*                             1118
112520  012746  007064                        MOV     #FMT.9,-(SP)
112524  012746  000002                        MOV     #2,-(SP)
112530  010600                                MOV     SP,R0                   ; SP,*
112532  104414                                TRAP    14
112534  026727  101252  000100                CMP     CHIP.SIZ,#100           ;                                       1118
112542  001020                                BNE     3$
112544  010100                                MOV     R1,R0                   ; DSA.CNT,*                             1118
112546  006200                                ASR     R0
112550  006200                                ASR     R0
112552  006200                                ASR     R0
112554  000300                                SWAB    R0
112556  042700  177760                        BIC     #177760,R0
112562  010046                                MOV     R0,-(SP)
112564  005216                                INC     (SP)
112566  012746  007030                        MOV     #FMT.8,-(SP)
112572  012746  000002                        MOV     #2,-(SP)
112576  010600                                MOV     SP,R0                   ; SP,*
112600  104414                                TRAP    14
112602  000415                                BR      4$                      ;                                       1118
112604  010100                        3$:     MOV     R1,R0                   ; DSA.CNT,*                             1118
112606  006200                                ASR     R0
112610  000300                                SWAB    R0
112612  042700  177760                        BIC     #177760,R0
112616  010046                                MOV     R0,-(SP)
112620  005216                                INC     (SP)
112622  012746  007030                        MOV     #FMT.8,-(SP)
112626  012746  000002                        MOV     #2,-(SP)
112632  010600                                MOV     SP,R0                   ; SP,*
112634  104414                                TRAP    14
112636  062706  000022                4$:     ADD     #22,SP                  ;                                       1117
112642  104467                        5$:     TRAP    67                      ;                                       1119
112644  006000                                ROR     R0
112646  103635                                BLO     1$
112650  005201                        6$:     INC     R1                      ; DSA.CNT                               1116
112652  020102                        7$:     CMP     R1,R2                   ; DSA.CNT,*
112654  101632                                BLOS    1$
112656  000207                                RTS     PC                      ;                                       1112

                                        ; Routine Size:  111 words
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:3?    PA:<
                                ; Maximum stack depth per invocation:  12 words
                                        .SBTTL  T60 TEST CODE SECTION
112660                          T60::
112660  004767  177436          1$:     JSR     PC,$T60                 ;                               1119
112664  104466                          TRAP    66
112666  006000                          ROR     R0
112670  103773                          BLO     1$
112672  000207                          RTS     PC
                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
;       11198 !<BLF/PAGE>
```

```
26069 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
26070 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)
26071
26072 ;          11199 !
26073 ;          11200 !
26074 ;          11201 BGNTST;                                  !BEGIN THE TEST
26075 ;          11202
26076 ;          11203 !++
26077 ;          11204 !  TEST NUMBER: TST 61
26078 ;          11205 !
26079 ;          11206 !  TEST NAME:   BATTERY BACK-UP TEST
26080 ;          11207 !
26081 ;          11208 !  TEST DESCRIPTION:
26082 ;          11209 !       THIS TEST IS DESIGNED SPECIFICALLY FOR THE
26083 ;          11210 !       MARLBORO MFG'ING VERIFY STATION.  ITS PURPOSE
26084 ;          11211 !       IS TO TEST THE ML-11 SYSTEM FOR BATTERY BACK-UP DURING
26085 ;          11212 !       POWER LOSS AND NO ECC INITIALIZE DURING POWER
26086 ;          11213 !       UP WITH GOOD BATTERY BACK-UP.
26087 ;          11214 !
26088 ;          11215 !--
26089 ;          11216
26090 ;          11217 local
26091 ;          11218     DSA_CNT,                             !COUNTS THE NUMBER OF BLOCKS TRANSFERED
26092 ;          11219     SIZE,                                !STORES THE SIZE OF MASS BUS TRANSFERS
26093 ;          11220     DST,                                 !STORES THE DESTINATION ADRS OF MASS BUS TRANSFERS
26094 ;          11221     SRC,                                 !STORES THE SOURCE ADRS OF MASS BUS TRANSFERS
26095 ;          11222     INIT_ERR,                            !COUNTS THE # OF WORDS FOUND TO HAVE ZEROES DATA
26096 ;          11223     BB_ERR;                    !COUNTS THE # OF WORDS FOUND TO HAVE NONE ONES DATA BUT NOT 0'S DATA
26097 ;          11224
26098 ;          11225 !+
26099 ;          11226 ! PERFORM THIS TEST ONLY IF THE OPERATOR HAS
26100 ;          11227 ! ENABLED MANUAL INTERVENTION TEST VIA THE S/W
26101 ;          11228 ! QUESTIONS.
26102 ;          11229 !-
26103 ;          11230
26104 ;          11231 if .INTERVEN                              !DO THIS TEST IF INTERVEN IS SET
26105 ;          11232 then
26106 ;          11233     begin
26107 ;          11234 !
26108 ;          11235 !
26109 ;          11236 ! PRINT WHICH TEST NUMBER THIS
26110 ;          11237 !
26111 ;          11238 !
26112 ;          11239     PRINTB (ONE_FMT, T_61);
26113 ;          11240 !
26114 ;          11241 !
26115 ;          11242 ! TO START THE TEST OFF WRITE THE ENTIRE ML-11 MEMORY
26116 ;          11243 ! WITH ALL ONES DATA.  THIS WILL BE THE BACK GROUND FOR
26117 ;          11244 ! THE ECC INITIALIZE PORTION OF THIS TEST.  THIS ALL ONES
26118 ;          11245 ! DATA PATTERN SHOULD STILL BE IN MEMORY AFTER THE POWER
26119 ;          11246 ! IS TURNED BACK ON WITH GOOD BATTERY BACK-UP.
26120 ;          11247 !
26121 ;          11248 !
26122 ;          11249     CLR_MBUS;                            !CLEAR THE MASS BUS
26123 ;          11250     IO_BUF = ONES;                       !LOAD THE FIRST IO BUF WORD WITH ONES DATA
```

```
26125 ;ML4AD
26126 ;                 TEST CODE SECTION
26127 ;
26128 ;          11251      DSA_CNT = -1;                                   !RESET THE DSA COUNTER
26129 ;          11252
26130 ;          11253      do                                              !LOAD ALL OF MEMORY WITH ONE'S DATA
26131 ;          11254          begin
26132 ;          11255          BREAK;                                      !LOOK FOR CONTROL C
26133 ;          11256          DSA_CNT = .DSA_CNT + 1;                     !UP THE DSA COUNTER
26134 ;          11257          WRT_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);       !DO THE WRITE XFER
26135 ;          11258          end
26136 ;          11259 !
26137 ;          11260 !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
26138 ;          11261 !
26139 ;          11262      until .DSA_CNT eqlU .LST_BLK;                   !REPEAT WRITING UNTIL THE LAST BLOCK IS DONE
26140 ;          11263
26141 ;          11264 !
26142 ;          11265 !
26143 ;          11266 ! SET THE VOLUMN VALID BIT 'VV'
26144 ;          11267 ! AND TELL THE OPERATOR TO TURN THE BOX
26145 ;          11268 ! POWER OFF WITH GOOD BATTERY BACK-UP.
26146 ;          11269 ! THE BACK GROUND PATTERN OF ALL ONES SHOULD
26147 ;          11270 ! BE MAINTAINED BY BATTERY BACK-UP AND ECC INIT
26148 ;          11271 ! ON POWER UP SHOULD NOT CLEAR THE PATTERN OUT.
26149 ;          11272 !
26150 ;          11273 !
26151 ;          11274      CLR_MBUS;                                       !CLEAR THE MASS BUS
26152 ;          11275      MLCS1 = RD_IN_PRE;                              !SET THE VV BIT via A RD_IN_PRE FUNC
26153 ;          11276      PRINTB (ONE_FMT, PWR_OFF);                      !TELL OPERATOR TO SHUT POWER OFF
26154 ;          11277
26155 ;          11278      do                                              !DO NOTHING
26156 ;          11279          begin
26157 ;          11280          BREAK;                                      !LOOK FOR CONTROL C
26158 ;          11281          end
26159 ;          11282      until not (.MOL);                               !UNTIL THE DRIVE POWER IS OFF
26160 ;          11283
26161 ;          11284      DELAY (TWO_TH_US);                              !DELAY FOR BATTERY BACK-UP MAINTAIN MEMORY
26162 ;          11285 !
26163 ;          11286 !
26164 ;          11287 ! NOW TELL THE OPERATOR TO POWER UP THE BOX
26165 ;          11288 ! WITH GOOD BATTERY BACK-UP.  THEN TEST THE
26166 ;          11289 ! VV BIT TO BE STILL SET AND THE BACK GROUND
26167 ;          11290 ! PATTERN OF ALL ONES TO STILL BE IN MEMORY.
26168 ;          11291 !
26169 ;          11292 !
26170 ;          11293      PRINTB (ONE_FMT, PUP_BB);                       !TELL OPERATOR TO TURN BOX POWER BACK ON
26171 ;          11294
26172 ;          11295      do                                              !DO NOTHING
26173 ;          11296          begin
26174 ;          11297          BREAK;                                      !LOOK FOR CONTROL C
26175 ;          11298          end
26176 ;          11299      until .DRY;                                     !UNTIL THE DRIVE IS READY
26177 ;          11300
26178 ;          11301      DELAY (10);                                     !WAIT FOR THE DRIVE TO SETILE
26179 ;          11302
```

```
26181 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
26182 ;                TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)
26183 ;
26184 ;          11303     if not (.VV)                        !DID RECOVERING UP WITH GOOD BB CLEAR THE VV BIT
26185 ;          11304     then
26186 ;          11305         begin                           !THE VV BIT GOT CLEARED
26187 ;          11306         ERRDF (154, ASYNC, DUMPER);     !REPORT THE ERROR TO THE OPERATOR
26188 ;          11307         PRINTB (ONE_FMT, BB_VV_ERR);    !TELL WHAT THE ERROR IS
26189 ;          11308         end;
26190 ;          11309
26191 ;          11310     INIT_ERR = ZERO;                    !CLEAR THE INIT COUNTER
26192 ;          11311     BB_ERR = ZERO;                      !CLEAR THE BATTERY BACK-UP COUNTER
26193 ;          11312     DSA_CNT = -1;                       !RESET THE DSA COUNTER
26194 ;          11313
26195 ;          11314     do                                  !WRITE CHECK MEMORY AND TEST FOR BAT BACK-UP AND/OR NO ECC INIT
26196 ;          11315         begin
26197 ;          11316         BREAK;                          !LOOK FOR CONTROL C
26198 ;          11317         DSA_CNT = .DSA_CNT + 1;         !UP THE DSA COUNTEER
26199 ;          11318         WRT_CHK_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);   !DO THE WRITE CHECK XFER
26200 ;          11319
26201 ;          11320         if .WCE                         !IS THIS BLOCK IN ERROR
26202 ;          11321         then
26203 ;          11322             begin                       !THIS BLOCK IS IN ERROR
26204 ;          11323
26205 ;          11324             if .MLDB eql ZERO           !SEE WHAT KIND OF AN ERROR IT IS
26206 ;          11325             then
26207 ;          11326                 INIT_ERR = .INIT_ERR + 1    !IT'S A INITIALIZE ERROR
26208 ;          11327             else
26209 ;          11328                 BB_ERR = .BB_ERR + 1;       !IT'S A BAT BACK-UP ERROR
26210 ;          11329
26211 ;          11330             end;
26212 ;          11331
26213 ;          11332         end
26214 ;          11333 !
26215 ;          11334 !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
26216 ;          11335 !
26217 ;          11336     until .DSA_CNT eqlU .LST_BLK;       !REPEAT WRITE CHECKING UNTIL THE LAST BLOCK
26218 ;          11337
26219 ;          11338 !
26220 ;          11339 ! IF THERE ARE MORE THAN 127 SECTORS IN
26221 ;          11340 ! ERROR WITH ALL ZEORES DATA THEN THE
26222 ;          11341 ! PROBLEM IS PROBIBLY IN
26223 ;          11342 ! THE ECC INITIALIZE LOGIC AND NOT IN THE
26224 ;          11343 ! BATTERY BACK-UP OF MEMORY.
26225 ;          11344 !
26226 ;          11345 ! IF INIT_ERR IS NOT > 127 AND THERE ARE
26227 ;          11346 ! > 100 WORDS READ WITH DATA OTHER THAN
26228 ;          11347 ! ALL ONES OR ALL ZEROES THEN THE PROBLEM
26229 ;          11348 ! IS PROBIBLY CAUSED BY THE BATTERY BACK-UP
26230 ;          11349 ! LOGIC NOT MAINTAINING THE MEMORY DURING
26231 ;          11350 ! POWER FAILURE.
26232 ;          11351 !
26233 ;          11352
26234 ;          11353     if .INIT_ERR gtr 127                !IS THE ECC INIT LOGIC IN ERROR
26235 ;          11354     then
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)

;          11355         begin                                  !THE ECC INIT LOGIC IS IN ERROR
;          11356         ERRDF (155, ASYNC, DUMPER);            !REPORT THE ERROR TO THE OPERATOR
;          11357         PRINTB (ONE_FMT, BB_INIT_ERR);         !TELL WHAT THE ERROR IS
;          11358         end
;          11359     else
;          11360         begin                                  !THE ECC INIT LOGIC IS NOT IN ERROR
;          11361
;          11362         if .BB_ERR gtr 100                     !IS THE BATTERY BACK-UP LOGIC IN ERROR
;          11363         then
;          11364             begin                              !THE BATTERY BACK-UP LOGIC IS IN ERROR
;          11365             ERRDF (156, ASYNC, DUMPER);        !REPORT THE ERROR TO THE OPERATOR
;          11366             PRINTB (ONE_FMT, BB_BB_ERR);       !TELL WHAT THE ERROR IS
;          11367             end;
;          11368
;          11369         end;
;          11370
;          11371     end;
;          11372
;          11373 ENDTST;                                        !END THE TEST

                                        .SBTTL  $T61 TEST CODE SECTION
112674  004167  071712          $T61:   JSR     R1,$SAVE5                       ;                       1119
112700  024646                          CMP     -(SP),-(SP)
112702  032767  000001  067500          BIT     #1,INTERVEN                     ;                       1123
112710  001002                          BNE     1$
112712  000167  000600                  JMP     20$
112716  012746  005012          1$:     MOV     #T.61,-(SP)                     ;                       1123
112722  012746  010240                  MOV     #ONE.FMT,-(SP)
112726  012746  000002                  MOV     #2,-(SP)
112732  010600                          MOV     SP,R0                           ; SP,*
112734  104414                          TRAP    14
112736  152777  000040  102500          BISB    #40,@ML.REG+40
112744  016705  103062                  MOV     ML.DUT,R5
112750  042705  177770                  BIC     #177770,R5
112754  142777  000007  102462          BICB    #7,@ML.REG+40
112762  150577  102456                  BISB    R5,@ML.REG+40
112766  012767  177777  101026          MOV     #-1,IO.BUF                      ;                       1125
112774  012702  177777                  MOV     #-1,R2                          ; *,DSA.CNT             1125
113000  104422                  2$:     TRAP    22                              ;                       1125
113002  005202                          INC     R2                              ; DSA.CNT               1125
113004  012705  177400                  MOV     #-400,R5                        ; *,SIZE                1125
113010  010546                          MOV     R5,-(SP)                        ; SIZE,*
113012  010266  000010                  MOV     R2,10(SP)                       ; DSA.CNT,DST
113016  010246                          MOV     R2,-(SP)                        ; DSA.CNT,*
113020  012701  014022                  MOV     #IO.BUF,R1                      ; *,SRC
113024  010146                          MOV     R1,-(SP)                        ; SRC,*
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

113026  004767  114374                          JSR     PC,WRT.TRANSFER
113032  062706  000006                          ADD     #6,SP                   ;                                       1125
113036  020267  100752                          CMP     R2,LST.BLK              ; DSA.CNT,*                             1126
113042  001356                                  BNE     2$
113044  152777  000040  102372                  BISB    #40,@ML.REG+40
113052  016704  102754                          MOV     ML,DUT,R4
113056  042704  177770                          BIC     #177770,R4
113062  142777  000007  102354                  BICB    #7,@ML.REG+40
113070  150477  102350                          BISB    R4,@ML.REG+40
113074  012777  000021  102302                  MOV     #21,@ML.REG             ;                                       1127
113102  012716  005112                          MOV     #PWR.OFF,(SP)           ;                                       1127
113106  012746  010240                          MOV     #ONE.FMT,-(SP)
113112  012746  000002                          MOV     #2,-(SP)
113116  010600                                  MOV     SP,R0                   ; SP,*
113120  104414                                  TRAP    14
113122  104422                          3$:     TRAP    22                      ;                                       1127
113124  032777  010000  102322                  BIT     #10000,@ML.REG+50       ;                                       1128
113132  001373                                  BNE     3$
113134  012703  003720                          MOV     #3720,R3                ; *,$$TMP2                              1128
113140  001411                          4$:     BEQ     7$
113142  016704  066750                          MOV     L$DLY,R4                ; *,$$TMP1
113146  001404                                  BEQ     6$
113150  005066  000014                  5$:     CLR     14(SP)                  ; $$TMP
113154  005304                                  DEC     R4                      ; $$TMP1
113156  001374                                  BNE     5$
113160  005303                          6$:     DEC     R3                      ; $$TMP2
113162  000766                                  BR      4$
113164  012716  006060                  7$:     MOV     #PUP.BB,(SP)            ;                                       1129
113170  012746  010240                          MOV     #ONE.FMT,-(SP)
113174  012746  000002                          MOV     #2,-(SP)
113200  010600                                  MOV     SP,R0                   ; SP,*
113202  104414                                  TRAP    14
113204  104422                          8$:     TRAP    22                      ;                                       1129
113206  105777  102242                          TSTB    @ML.REG+50              ;                                       1129
113212  100374                                  BPL     8$
113214  012703  000012                          MOV     #12,R3                  ; *,$$TMP2                              1130
113220  001411                          9$:     BEQ     12$
113222  016704  066670                          MOV     L$DLY,R4                ; *,$$TMP1
113226  001404                                  BEQ     11$
113230  005066  000020                  10$:    CLR     20(SP)                  ; $$TMP
113234  005304                                  DEC     R4                      ; $$TMP1
113236  001374                                  BNE     10$
113240  005303                          11$:    DEC     R3                      ; $$TMP2
113242  000766                                  BR      9$
113244  132777  000100  102202          12$:    BITB    #100,@ML.REG+50         ;                                       1130
113252  001016                                  BNE     13$
113254  104455                                  TRAP    55                      ;                                       1130
113256  000232                                  .WORD   232
113260  012706                                  .WORD   ASYNC
113262  026302                                  .WORD   DUMPER
113264  012746  006150                          MOV     #BB.VV.ERR,-(SP)        ;                                       1130
113270  012746  010240                          MOV     #ONE.FMT,-(SP)
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                        ;       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
                                        ;ML4AD
                                        ;       TEST CODE SECTION
                                        ;
                                        ;
                                        ;
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

113520  000207                                  RTS     PC

                                        ; Routine Size:  203 words
                                        ; Maximum stack depth per invocation:  18 words



                                                .SBTTL  T61 TEST CODE SECTION
113522                                  T61::
113522  004767  177146                  1$:     JSR     PC,$T61                         ;                                1137
113526  104466                                  TRAP    66
113530  006000                                  ROR     R0
113532  103773                                  BLO     1$
113534  000207                                  RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;          11374 !<BLF/PAGE>
```

```
                                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (114)
 26443 ;ML4AD
 26444 ;                 TEST CODE SECTION
 26445
 26446 ;          11375 !
 26447 ;          11376 ! CLEAN UP SECTION
 26448 ;          11377 !
 26449 ;          11378 !       THE CLEAN UP SECTION IS ENTERED WHEN:
 26450 ;          11379 !       1.  A NORMAL END OF PASS IS DONE
 26451 ;          11380 !           ie. WHEN ONE COMPLETE PASS OF
 26452 ;          11381 !               THE DIAG IS DONE.
 26453 ;          11382 !
 26454 ;          11383 !       2.  WHEN A DRIVE ERROR IS DECTECTED AND
 26455 ;          11384 !           AND THE UNIT IS DROPPED AND THE DOCLN
 26456 ;          11385 !           MACRO IS CALLED.
 26457 ;          11386 !
 26458 ;          11387 !       3.  WHEN A ^C IS TYPE AT THE CONSOLE TERMINAL
 26459 ;          11388 !           DURING EXECUTION OF A TEST.
 26460 ;          11389 !
 26461 ;          11390 !       IN ANY EVENT OF ENTERING THIS SECTION THE
 26462 ;          11391 !       ML11 CONTROL BOARD TESTER'S POWER SUPPLIES
 26463 ;          11392 !       ARE POWERED DOWN via THE ROUTINE CALL: ''
 26464 ;          11393
 26465 ;          11394 !++
 26466 ;          11395 BGNCLN;                                   !BEGIN THE CLEAN UP CODE
 26467 ;          11396 CLR = ONE;                                !CLEAR THE MASS BUS
 26468 ;          11397 return;                                   !RETURN TO DRS>
 26469 ;          11398 ENDCLN;                                   !END THE CLEAN UP CODE
 26473
 26474                                  .SBTTL  LCLEAN TEST CODE SECTION
 26478 113536  152777  000040  101700  LCLEAN: BISB    #40,@ML.REG+40          ;                1139
 26479 113544  000207                          RTS     PC                      ;                1137
 26480
 26481                                  ; Routine Size:  4 words
 26482                                  ; Maximum stack depth per invocation:  0 words
 26487
 26488
 26492
 26493                                  .SBTTL  L$CLEAN TEST CODE SECTION
 26497 113546                           L$CLEAN::
```

```
                                ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<

113546  004767  177764                 JSR     PC,LCLEAN               ;                               1139
113552  104412                         TRAP    12
113554  000207                         RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words

;       11399 LASTAD;                                   !DEFINE THE DIAG'S LAST ADDRESS
;       11400 BGNSETUP (0);                             !SET UP ZERO P-TABLES
;       11401 ENDSETUP;                                 !END THE SETUP

113556  113562                 BL$LAS::.WORD   T$FREE
113560  000000                         .WORD   <<T$FREE-<BL$LAS+4>>/2>
113562  000000                 T$FREE::.WORD   0

        113562                 L$LAST==            BL$LAS+4
        000000                 T$PTHV==            0

                                        .SBTTL  $END.LINK TEST CODE SECTION
113564                          $END.LINK::
113564  000207                         RTS     PC                      ;                               1139

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words

;       11402 end
;       11403
;       11404 eludom
```

```
                                ;ML4AD                                  29-Mar-1982 16:23:04    TOPS
                                ;                TEST CODE SECTION      29-Mar-1982 16:21:03    PA:<

                                ; OTS external references
                                        .GLOBL  BL$GT2, $SAVE5, $SAVE4, $SAVE3
                                        .GLOBL  $SAVE2, BL$PU2, BL$PU1, BL$GT1
                                        .GLOBL  BL$DIV, BL$MOD, BL$MUL




                                ; Size:         15786 code + 2346 data words
                                ; Run Time:     02:46.0
                                ; Elapsed Time: 03:20.7
                                ; Memory Used:  124 pages
                                ; Compilation Complete

000001                                  .END
```

```
A)R    = 000020 G      C$CLCK= 000062      D2.TEM= 013376      FNC.19= 012426      HELP   = 000000
ARR.DA= 013012         C$CLEA= 000012      EF.CON= 000036 G    FNC.2  = 012164      HOE    = 100000 G
ARR.IN  014004         C$CLOS= 000035      EF.NEW= 000035 G    FNC.21= 012440      HW.OR.  013402
ARR.16  014016         C$CLP1= 000006      EF.PWR= 000034 G    FNC.22= 012452      IBE    = 010000 G
ASSEMB= 000010         C$CVEC= 000036      EF.RES= 000037 G    FNC.23= 012464      IDU    = 000040 G
ASYNC  = 012706        C$DCLN= 000044      EF.STA= 000040 G    FNC.3  = 012172      IER    = 020000 G
A.CAL   015362         C$DODU= 000051      EIG.FM= 010364      FNC.4  = 012200      INTER  = 013114
A.GEN   015370         C$DRPT= 000024      ELV.FM= 010466      FNC.5  = 012216      INTERV  002410 G
BB.BB.= 006334         C$DU   = 000053     ERRBLK  002160 G    FNC.6  = 012226      IO.BUF  014022
BB.INI= 006242         C$EDIT= 000003      ERRMSG  002156 G    FNC.7  = 012234      ISR    = 000100 G
BB.VV.= 006150         C$ERDF= 000055      ERRNBR  002154 G    FNC.8  = 012244      IXE    = 004000 G
BIT0   = 000001 G      C$ERHR= 000056      ERRTHR  002402 G    FNC.9  = 012260      I$AU   = 000041
BIT00  = 000001 G      C$ERRO= 000060      ERRTYP  002152 G    FORCE.  020032       I$AUTO= 000041
BIT01  = 000002 G      C$ERSF= 000054      ERR.CH  017442      FOR.EC  020210       I$CLN  = 000041
BIT02  = 000004 G      C$ERSO= 000057      EVL    = 000004 G   FOR.FM= 010270       I$DU   = 000041
BIT03  = 000010 G      C$ESCA= 000010      E$END  = 002100     F$AU   = 000015      I$HRD  = 000041
BIT04  = 000020 G      C$ESEG= 000005      E$LOAD= 000035      F$AUTO= 000020       I$INIT= 000041
BIT05  = 000040 G      C$ESUB= 000003      E2.TEM= 013400      F$BGN  = 000040      I$MOD  = 000041
BIT06  = 000100 G      C$ETST= 000001      FIND.C  017660      F$CLEA= 000007       I$MSG  = 000041
BIT07  = 000200 G      C$EXIT= 000032      FIRST.  020262      F$DU   = 000016      I$PROT= 000040
BIT08  = 000400 G      C$GETB= 000026      FIV.FM= 010304      F$END  = 000041      I$PTAB= 000041
BIT09  = 001000 G      C$GETW= 000027      FMT.1  = 006442     F$HARD= 000004       I$PWR  = 000041
BIT1   = 000002 G      C$GMAN= 000043      FMT.10= 007116      F$HW   = 000013      I$RPT  = 000041
BIT10  = 002000 G      C$GPHR= 000042      FMT.11= 007170      F$INIT= 000006       I$SEG  = 000041
BIT11  = 004000 G      C$GPLO= 000030      FMT.12= 007224      F$JMP  = 000050      I$SETU= 000041
BIT12  = 010000 G      C$GPRI= 000040      FMT.13= 007254      F$MOD  = 000000      I$SFT  = 000041
BIT13  = 020000 G      C$INIT= 000011      FMT.14= 007330      F$MSG  = 000011      I$SRV  = 000041
BIT14  = 040000 G      C$INLP= 000020      FMT.15= 007370      F$PROT= 000021       I$SUB  = 000041
BIT15  = 100000 G      C$MANI= 000050      FMT.16= 007436      F$PWR  = 000017      I$TST  = 000041
BIT2   = 000004 G      C$MEM  = 000031     FMT.17= 007526      F$RPT  = 000012      J$JMP  = 000167
BIT3   = 000010 G      C$MSG  = 000023     FMT.18= 007562      F$SEG  = 000003      LAST.B  020344
BIT4   = 000020 G      C$OPEN= 000034      FMT.19= 007632      F$SOFT= 000005       LAU     004704
BIT5   = 000040 G      C$PNTB= 000014      FMT.2  = 006506     F$SRV  = 000010      LAUTO   004660
BIT6   = 000100 G      C$PNTF= 000017      FMT.20= 007702      F$SUB  = 000002      LCLEAN  113536
BIT7   = 000200 G      C$PNTS= 000016      FMT.21= 007754      F$SW   = 000014      LDU     004672
BIT8   = 000400 G      C$PNTX= 000015      FMT.22= 010026      F$TEST= 000001       LD.LNG  021354
BIT9   = 001000 G      C$QIO  = 000377     FMT.23= 010072      GD.BLK  020312       LIMIT   015400
BL$DIV  004446 G       C$RDBU= 000007      FMT.24= 010142      GOOD.B  014006       LINIT   027650
BL$GT1  003512 G       C$REFG= 000047      FMT.25= 010166      G$CNTO= 000200       LOAD.S  016034
BL$GT2  003634 G       C$RESE= 000033      FMT.26= 010206      G$DELM= 000372       LOE    = 040000 G
BL$LAS  113556 G       C$REVI= 000003      FMT.3  = 006574     G$DISP= 000003       LOT    = 000010 G
BL$MOD  004460 G       C$RFLA= 000021      FMT.4  = 006620     G$EXCP= 000400       LRPT    004646
BL$MUL  004222 G       C$RPT  = 000025     FMT.5  = 006650     G$HILI= 000002       LST.AR  014020
BL$PU1  003776 G       C$SEFG= 000046      FMT.6  = 006752     G$LOLI= 000001       LST.BL  014014
BL$PU2  004072 G       C$SPRI= 000041      FMT.7  = 007002     G$NO   = 000000      LST.DU  015356
BL$SHF  004472 G       C$SVEC= 000037      FMT.8  = 007030     G$OFFS= 000400       L$ACP   002110 G
BOE    = 000400 G      C$TPRI= 000013      FMT.9  = 007064     G$OFSI= 000376       L$APT   002036 G
B.CAL   015364         DATA.L= 013154      FNC.1  = 012150     G$PRMA= 000001       L$AU    004706 G
B.GEN   015372         DAT.DM  016412      FNC.10= 012272      G$PRMD= 000002       L$AUT   002070 G
CAL.CR  017042         DFPTBL  002360 G    FNC.11= 012302      G$PRML= 000000       L$AUTO  004662 G
CHIP.S  014012         DIAGMC= 000000      FNC.12= 012322      G$RADA= 000140       L$CCP   002106 G
C$AU   = 000052        DIVMOD  004264      FNC.13= 012334      G$RADB= 000000       L$CLEA  113546 G
C$AUTO= 000061         DRIVE.  015354      FNC.14= 012344      G$RADD= 000040       L$CO    002032 G
C$BRK  = 000022        DROP.C  015402      FNC.15= 012360      G$RADL= 000120       L$DEPO  002011 G
C$BSEG= 000004         DT.1    015764      FNC.16= 012372      G$RADO= 000020       L$DESC  002130 G
C$BSUB= 000002         DUMPER  026302 G    FNC.17= 012404      G$XFER= 000004       L$DESP  002076 G
C$CEFG= 000045         D1.TEM= 013374      FNC.18= 012414      G$YES  = 000010      L$DEVP  002060 G
```

L$DISP	002164	G	MSGH7	003052		P.AAC	005112	P.ACH	010566	P.AEM	011454
L$DLY	002116	G	MSGS1	003160		P.AAD	005202	P.ACI	010602	P.AEN	011462
L$DTP	002040	G	MSGS2	003224		P.AAE	005272	P.ACJ	010616	P.AEO	011470
L$DTYP	002034	G	MSGS3	003270		P.AAF	005340	P.ACK	010630	P.AEP	011474
L$DU	004674	G	MSGS4	003334		P.AAG	005414	P.ACL	010640	P.AEQ	011502
L$DUT	002072	G	MSGS5	003400		P.AAH	005470	P.ACM	010650	P.AER	011514
L$DVTY	002122	G	M$DUMP	026312		P.AAI	005570	P.ACN	010660	P.AES	011524
L$EF	002052	G	NIB.SA	013374		P.AAJ	005652	P.ACO	010664	P.AET	011532
L$ENVI	002044	G	NIN.FM=	010410		P.AAK	005722	P.ACP	010676	P.AEU	011540
L$ERRT	002152	G	NO.INI=	005470		P.AAL	005764	P.ACQ	010704	P.AEV	011552
L$ETP	002102	G	ONEFIL=	000001		P.AAM	006060	P.ACR	010712	P.AEW	011562
L$EXP1	002046	G	ONEPAS	002406	G	P.AAN	006150	P.ACS	010724	P.AEX	011570
L$EXP4	002064	G	ONE.FM=	010240		P.AAO	006242	P.ACT	010730	P.AEY	011610
L$EXP5	002066	G	OP.NUM	014002		P.AAP	006334	P.ACU	010736	P.AEZ	011626
L$HARD	002414	G	O$APTS=	000001		P.AAQ	006442	P.ACV	010744	P.AFA	011644
L$HIME	002120	G	O$AU =	000001		P.AAR	006506	P.ACW	010752	P.AFB	011676
L$HPCP	002016	G	O$BGNR=	000001		P.AAS	006574	P.ACX	010766	P.AFC	011714
L$HPTP	002022	G	O$BGNS=	000001		P.AAT	006620	P.ACY	010774	P.AFD	011726
L$HW	002360	G	O$DU =	000001		P.AAU	006650	P.ACZ	011002	P.AFE	011740
L$ICP	002104	G	O$ERRT=	000001		P.AAV	006752	P.ADA	011016	P.AFF	011762
L$INIT	030714	G	O$GNSW=	000001		P.AAW	007002	P.ADB	011024	P.AFG	011774
L$LADP	002026	G	O$POIN=	000001		P.AAX	007030	P.ADC	011032	P.AFH	012006
L$LAST=	113562	G	O$SETU=	000001		P.AAY	007064	P.ADD	011046	P.AFI	012020
L$LOAD	002100	G	PAR.DI	014010		P.AAZ	007116	P.ADE	011054	P.AFJ	012036
L$LUN	002074	G	PD.TEM	015342		P.ABA	007170	P.ADF	011070	P.AFK	012060
L$MREV	002050	G	PHR.1 =	011610		P.ABB	007224	P.ADG	011076	P.AFL	012104
L$NAME	002000	G	PHR.10=	012006		P.ABC	007254	P.ADH	011102	P.AFM	012136
L$PRIO	002042	G	PHR.11=	012020		P.ABD	007330	P.ADI	011110	P.AFN	012150
L$PROT	003444	G	PHR.12=	012036		P.ABE	007370	P.ADJ	011116	P.AFO	012164
L$PRT	002112	G	PHR.13=	012060		P.ABF	007436	P.ADK	011122	P.AFP	012172
L$REPP	002062	G	PHR.14=	012104		P.ABG	007526	P.ADL	011132	P.AFQ	012200
L$REV	002010	G	PHR 15=	012136		P.ABH	007562	P.ADM	011140	P.AFR	012216
L$RPT	004650	G	PHR.2 =	011626		P.ABI	007632	P.ADN	011150	P.AFS	012226
L$SOFT	003122	G	PHR.3 =	011644		P.ABJ	007702	P.ADO	011154	P.AFT	012234
L$SPC	002056	G	PHR.4 =	011676		P.ABK	007754	P.ADP	011170	P.AFU	012244
L$SPCP	002020	G	PHR.5 =	011714		P.ABL	010026	P.ADQ	011176	P.AFV	012260
L$SPTP	002024	G	PHR.6 =	011726		P.ABM	010072	P.ADR	011206	P.AFW	012272
L$STA	002030	G	PHR.7 =	011740		P.ABN	010142	P.ADS	011214	P.AFX	012302
L$SW	002400	G	PHR.8 =	011762		P.ABO	010166	P.ADT	011226	P.AFY	012322
L$TEST	002114	G	PHR.9 =	011774		P.ABP	010206	P.ADU	011240	P.AFZ	012334
L$TIML	002014	G	PNT =	001000	G	P.ABQ	010240	P.ADV	011250	P.AGA	012344
L$UNIT	002012	G	PRI =	002000	G	P.ABR	010246	P.ADW	011260	P.AGB	012360
L10000	002376		PRI00 =	000000	G	P.ABS	010256	P.ADX	011270	P.AGC	012372
L10001	002412		PRI01 =	000040	G	P.ABT	010270	P.ADY	011276	P.AGD	012404
L10002	002510		PRI02 =	000100	G	P.ABU	010304	P.ADZ	011310	P.AGE	012414
L10003	003160		PRI03 =	000140	G	P.ABV	010322	P.AEA	011316	P.AGF	012426
MB.DIS=	005570		PRI04 =	000200	G	P.ABW	010342	P.AEB	011326	P.AGG	012440
MEM.AR=	013052		PRI05 =	000240	G	P.ABX	010364	P.AEC	011336	P.AGH	012452
ML.DUT	016032		PRI06 =	000300	G	P.ABY	010410	P.AED	011344	P.AGI	012464
ML.LUN	016030		PRI07 =	000340	G	P.ABZ	010436	P.AEE	011352	P.AGJ	012500
ML.REG	015404		PRSN	002400	G	P.ACA	010466	P.AEF	011362	P.AGK	012510
MSGH1	002510		PTBL.P	014000		P.ACB	010520	P.AEG	011374	P.AGL	012516
MSGH2	002556		PUP.BB=	006060		P.ACC	010524	P.AEH	011400	P.AGM	012524
MSGH3	002624		PWR.OF=	005112		P.ACD	010536	P.AEI	011416	P.AGN	012532
MSGH4	002670		PWR.ON=	005202		P.ACE	010544	P.AEJ	011432	P.AGO	012540
MSGH5	002736		P.AAA	004716		P.ACF	010552	P.AEK	011440	P.AGP	012546
MSGH6	003004		P.AAB	005012		P.ACG	010560	P.AEL	011446	P.AGQ	012554

SYMBOL TABLE

```
P.AGR   012562          REG.20= 012666          T$TEMP= 000000          T51     103202 G        WRD.43= 011176
P.AGS   012570          REG.21= 012676          T$TEST= 000000          T52     104020 G        WRD.44= 011206
P.AGT   012576          REG.3 = 012516          T$TSTM= 177777          T53     104660 G        WRD.45= 011214
P.AGU   012604          REG.4 = 012524          T$TSTS= 000000          T54     105722 G        WRD.46= 011226
P.AGV   012612          REG.5 = 012532          T$$HAR= 010002          T55     106612 G        WRD.47= 011240
P.AGW   012620          REG.6 = 012540          T$$HW = 010000          T56     107742 G        WRD.48= 011250
P.AGX   012626          REG.7 = 012546          T$$PRO= 010004          T57     111234 G        WRD.49= 011260
P.AGY   012634          REG.8 = 012554          T$$SOF= 010003          T58     111640 G        WRD.5 = 010552
P.AGZ   012642          REG.9 = 012562          T$$SW = 010001          T59     112306 G        WRD.50= 011270
P.AHA   012652          REM.TB  015664          T.21  = 004716          T6      033476 G        WRD.51= 011276
P.AHB   012660          RE2     004640          T.61  = 005012          T60     112660 G        WRD.52= 011310
P.AHC   012666          RE3     004636          T1      031134 G        T61     113522 G        WRD.53= 011316
P.AHD   012676          RE4     004634          T10     036266 G        T7      034354 G        WRD.54= 011326
P.AHE   012706          RH.ADD  016022          T11     036510 G        T8      035370 G        WRD.55= 011336
P.AHF   012750          RH.ERR= 013302          T12     037066 G        T9      035624 G        WRD.56= 011344
P.AHG   013012          RH.TYP  016024          T13     040230 G        UAM   = 000200 G        WRD.57= 011352
P.AHH   013052          RH.VEC  016026          T14     041462 G        UNS.ER= 005272          WRD.58= 011362
P.AHI   013114          SC.SET= 013214          T15     042714 G        VV.CLE= 005414          WRD.59= 011374
P.AHJ   013154          SEV.FM= 010342          T16     043556 G        VV.NOT= 005340          WRD.6 = 010560
P.AHK   013214          SFPTBL  002400 G        T17     045044 G        VV.SET= 005764          WRD.60= 011400
P.AHL   013250          SIX.FM= 010322          T18     045260 G        WC.ERR= 005652          WRD.61= 011416
P.AHM   013302          STACK   015034          T19     046430 G        WRD.1 = 010520          WRD.62= 011432
P.AHN   013330          STK.OF  015022          T2      031460 G        WRD.10= 010630          WRD.63= 011440
P.CAL   015366          STRIPP  016444          T20     047430 G        WRD.11= 010640          WRD.64= 011446
P.CNT   015376          SVCGBL= 177777          T21     051176 G        WRD.12= 010650          WRD.65= 011454
P.GEN   015374          SVCINS= 177777          T22     051724 G        WRD.13= 010660          WRD.67= 011462
RAS.IN  015346          SVCSUB= 177777          T23     052262 G        WRD.14= 010664          WRD.68= 011470
RD.CS1  021762          SVCTAG= 177777          T24     053456 G        WRD.15= 010676          WRD.69= 011474
RD.DA   022316          SVCTST= 177777          T25     054270 G        WRD.16= 010704          WRD.7 = 010566
RD.DAT  015352          SYNC  = 012750          T26     055466 G        WRD.17= 010712          WRD.70= 011502
RD.DS   025216          S$LSYM= 010000          T27     056244 G        WRD.18= 010724          WRD.71= 011514
RD.D1   024104          TEN.FM= 010436          T28     057230 G        WRD.19= 010730          WRD.72= 011524
RD.D2   024416          THR.FM= 010256          T29     060342 G        WRD.2 = 010524          WRD.73= 011532
RD.D3   024744          TIME.O= 013330          T3      031666 G        WRD.20= 010736          WRD.74= 011540
RD.EE   023760          TRBLE.= 013250          T30     061136 G        WRD.21= 010744          WRD.75= 011552
RD.EL   023716          TST.LN  020376          T31     062534 G        WRD.22= 010752          WRD.76= 011562
RD.ER   022140          TWO.FM= 010246          T32     064272 G        WRD.23= 010766          WRD.77= 011570
RD.E1   023074          T$ARGC= 000002          T33     065304 G        WRD.24= 010774          WRD.8 = 010602
RD.E2   023314          T$CODE= 004130          T34     066266 G        WRD.25= 011002          WRD.9 = 010616
RD.MR   022474          T$ERRN= 000000          T35     066744 G        WRD.26= 011016          WRT.CH  027156
RD.PA   022666          T$EXCP= 000000          T36     070030 G        WRD.27= 011024          WRT.CS  021712
RD.PD   023556          T$FREE  113562 G        T37     070756 G        WRD.29= 011032          WRT.DA  022246
RD.REG  025712          T$GMAN= 000000          T38     072032 G        WRD.3 = 010536          WRT.DS  025214
REGDMP  002404 G        T$HILI= 000007          T39     072460 G        WRD.30= 011046          WRT.D1  024020
REG.IN  015360          T$LAST= 000000          T4      032336 G        WRD.31= 011054          WRT.D2  024332
REG.1 = 012500          T$LOLI= 000000          T40     073436 G        WRD.32= 011070          WRT.D3  024644
REG.10= 012570          T$LSYM= 010000          T41     074516 G        WRD.33= 011076          WRT.EE  023756
REG.11= 012576          T$NEST= 177777          T42     075324 G        WRD.34= 011102          WRT.EL  023714
REG.12= 012604          T$NS0 = 000000          T43     076254 G        WRD.35= 011110          WRT.ER  022070
REG.13= 012612          T$NS1 = 000021          T44     076504 G        WRD.36= 011116          WRT.E1  023010
REG.14= 012620          T$PTHV= 000000 G        T45     076670 G        WRD.37= 011122          WRT.E2  023216
REG.15= 012626          T$PTNU= 000000          T46     077366 G        WRD.38= 011132          WRT.MR  022424
REG.16= 012634          T$SAVL= 177777          T47     077660 G        WRD.39= 011140          WRT.PA  022602
REG.17= 012642          T$SEGL= 177777          T48     100640 G        WRD.4 = 010544          WRT.PD  023450
REG.18= 012652          T$SUBN= 000000          T49     101376 G        WRD.40= 011150          WRT.RE  025324
REG.19= 012660          T$TAGL= 177777          T5      033006 G        WRD.41= 011154          WRT.TR  027426
REG.2 = 012510          T$TAGN= 010005          T50     102014 G        WRD.42= 011170          WT.DAT  015350
```

SYMBOL TABLE

W.C.SI	015374		$T11	036302	$T25	053472	$T39	072046	$T52	103216
W.ERR =	005.22		$T12	036524	$T26	054304	$T4	031702	$T53	104034
XOR.LN	021072		$T13	037102	$T27	055502	$T40	072474	$T54	104674
X$ALWA=	000000		$T14	040244	$T28	056260	$T41	073452	$T55	105736
X$FALS=	000040		$T15	041476	$T29	057244	$T42	074532	$T56	106626
X$OFFS=	000400		$T16	042730	$T3	031474	$T43	075340	$T57	107756
X$TRUE=	000020		$T17	043572	$T30	060356	$T44	076270	$T58	111250
$END.L	113564	G	$T18	045060	$T31	061152	$T45	076520	$T59	111654
$PATCH	003452	G	$T19	045274	$T32	062550	$T46	076704	$T6	033022
$SAVE2	004540	G	$T2	031150	$T33	064306	$T47	077402	$T60	112322
$SAVE3	004554	G	$T20	046444	$T34	065320	$T48	077674	$T61	112674
$SAVE4	004572	G	$T21	047444	$T35	066302	$T49	100654	$T7	033512
$SAVE5	004612	G	$T22	051212	$T36	066760	$T5	032352	$T8	034370
$T1	030724		$T23	051740	$T37	070044	$T50	101412	$T9	035404
$T10	035640		$T24	052276	$T38	070772	$T51	102030		

. ABS. 113566 000
        000000 001
ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 35594 WORDS (140 PAGES)
DYNAMIC MEMORY: 21558 WORDS (82 PAGES)
ELAPSED TIME: 00:16:01
ML11,ML11/-SP/CR:SYM=SVC/ML,CZMLAD.DOC,ML2AD,OTS,ML3AD,ML4AD

ML11 CREATED BY MACRO ON 30-MAR-82 AT 11:24 PAGE 1 SEQ 0550

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE		REFERENCES								
ADR	= 000020	G	#94-2561								
ARR.DA	= 013012		#98-2777	224-8947	230-9210	235-9514	243-9909	289-12284	290-12353	292-12438	336-14770
			342-15047	348-15402	349-15426	349-15450	350-15474	350-15494	361-16098	418-19076	424-19406
			447-20681	551-25985							
ARR.IN	014004		#88-2240	*205-8023	*205-8043	307-13243	308-13292	308-13294	359-15984	369-16514	369-16523
			388-17530	389-17548	391-17695	392-17713	440-20280	440-20284			
ARR.16	014016		#89-2251	*205-8008	*205-8024	*205-8044	308-13293				
ASSEMB	= 000010		6-13	6-13							
ASYNC	= 012706		#98-2775	216-8527	220-8730	224-8929	229-9188	235-9494	236-9556	243-9900	249-10237
			250-10261	250-10281	253-10418	256-10574	256-10590	257-10610	261-10817	261-10832	262-10853
			262-10870	262-10886	263-10924	263-10943	264-10971	268-11190	269-11209	269-11226	269-11243
			269-11259	270-11297	270-11316	271-11344	275-11587	276-11606	276-11623	276-11640	277-11660
			277-11694	278-11717	278-11741	282-11937	283-11957	283-11975	283-11991	284-12012	284-12029
			295-12602	299-12830	300-12851	300-12869	301-12905	301-12938	302-12984	306-13191	306-13207
			307-13228	307-13261	308-13311	316-13715	316-13729	316-13742	316-13758	317-13778	318-13835
			318-13855	319-13912	320-13958	324-14134	324-14156	325-14184	329-14369	355-15775	374-16800
			383-17250	393-17797	441-20351	458-21211	459-21237	459-21275	460-21301	460-21316	463-21466
			528-24795	536-25244	547-25801	557-26344	558-26382	558-26394			
A.CAL	015362		#89-2268	108-3283	*108-3284	*108-3285	111-3408	*483-22547	484-22582	*488-22798	489-22828
A.GEN	015370		#89-2271	111-3384	111-3408	*483-22544	484-22575	*488-22795	488-22817		
BB.BB.	= 006334		#95-2592	558-26396							
BB.INI	= 006242		#95-2591	558-26384							
BB.VV.	= 006150		#95-2590	557-26346							
BIT0	= 000001	G	#94-2545								
BIT00	= 000001	G	#94-2535								
BIT01	= 000002	G	#94-2534								
BIT02	= 000004	G	#94-2533								
BIT03	= 000010	G	#94-2532								
BIT04	= 000020	G	#94-2531								
BIT05	= 000040	G	#94-2530								
BIT06	= 000100	G	#94-2529								
BIT07	= 000200	G	#94-2528								
BIT08	= 000400	G	#94-2527								
BIT09	= 001000	G	#93-2522								
BIT1	= 000002	G	#94-2544								
BIT10	= 002000	G	#93-2521								
BIT11	= 004000	G	#93-2520								
BIT12	= 010000	G	#93-2519								
BIT13	= 020000	G	#93-2518								
BIT14	= 040000	G	#93-2517								
BIT15	= 100000	G	#93-2516								
BIT2	= 000004	G	#94-2543								
BIT3	= 000010	G	#94-2542								
BIT4	= 000020	G	#94-2541								
BIT5	= 000040	G	#94-2540								
BIT6	= 000100	G	#94-2539								
BIT7	= 000200	G	#94-2538								
BIT8	= 000400	G	#94-2537								
BIT9	= 001000	G	#94-2536								
BL$DIV	004446	G	#35-1170	112-3480	514-24072	520-24397	562-26560				
BL$GT1	003512	G	#11-169	424-19395	562-26559						
BL$GT2	003634	G	#16-384	104-3098	108-3255	113-3506	299-12824	301-12899	302-12978	334-14654	336-14740

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE		REFERENCES								
			348-15353	361-16070	368-16472	374-16773	380-17106	382-17223	389-17573	392-17737	399-18095
			406-18446	417-19045	418-19058	447-20663	478-22282	514-24096	521-24447	562-26558	
BL$LAS	113556	G	#561-26522	561-26523	561-26527						
BL$MOD	004460	G	#36-1201	113-3488	514-24111	520-24401	562-26560				
BL$MUL	004222	G	#32-1022	526-24705	562-26560						
BL$PU1	003776	G	#21-592	483-22532	562-26559						
BL$PU2	004072	G	#27-829	111-3383	111-3392	111-3401	301-12932	418-19097	515-24128	521-24418	562-26559
BL$SHF	004472	G	11-181	11-184	11-188	11-192	12-217	17-406	17-409	17-413	17-417
			17-438	21-595	21-599	21-605	22-632	27-838	27-842	27-848	28-880
			#37-1236								
BOE	= 000400	G	#94-2565								
B.CAL	015364		#89-2269	108-3289	*108-3290	*108-3291	111-3410	*483-22548	484-22583	*488-22799	489-22829
B.GEN	015372		#89-2272	111-3393	111-3410	*483-22545	484-22576	*488-22796	488-22818		
CAL.CR	017042		#107-3224	483-22550	488-22801						
CHIP.S	014012		#89-2248	*205-8022	*205-8042	551-25998					
C$AU	= 000052		#6-13								
C$AUTO	= 000061		#6-13								
C$BRK	= 000022		#6-13								
C$BSEG	= 000004		#6-13								
C$BSUB	= 000002		#6-13								
C$CEFG	= 000045		#6-13								
C$CLCK	= 000062		#6-13								
C$CLEA	= 000012		#6-13								
C$CLOS	= 000035		#6-13								
C$CLP1	= 000006		#6-13								
C$CVEC	= 000036		#6-13								
C$DCLN	= 000044		#6-13								
C$DODU	= 000051		#6-13								
C$DRPT	= 000024		#6-13								
C$DU	= 000053		#6-13								
C$EDIT	= 000003		#6-13	6-65							
C$ERDF	= 000055		#6-13								
C$ERHR	= 000056		#6-13								
C$ERRO	= 000060		#6-13								
C$ERSF	= 000054		#6-13								
C$ERSO	= 000057		#6-13								
C$ESCA	= 000010		#6-13								
C$ESEG	= 000005		#6-13								
C$ESUB	= 000003		#6-13								
C$ETST	= 000001		#6-13								
C$EXIT	= 000032		#6-13								
C$GETB	= 000026		#6-13								
C$GETW	= 000027		#6-13								
C$GMAN	= 000043		#6-13								
C$GPHR	= 000042		#6-13								
C$GPLO	= 000030		#6-13								
C$GPRI	= 000040		#6-13								
C$INIT	= 000011		#6-13								
C$INLP	= 000020		#6-13								
C$MANI	= 000050		#6-13								
C$MEM	= 000031		#6-13								
C$MSG	= 000023		#6-13								

ML11 CREATED BY MACRO ON 30-MAR-82 AT 11:24 PAGE 3 SEQ 0552

SYMBOL CROSS REFERENCE

SYMBOL	VALUE		REFERENCES
C$OPEN	= 000034		#6-13
C$PNTB	= 000014		#6-13
C$PNTF	= 000017		#6-13
C$PNTS	= 000016		#6-13
C$PNTX	= 000015		#6-13
C$QIO	= 000377		#6-13
C$RDBU	= 000007		#6-13
C$REFG	= 000047		#6-13
C$RESE	= 000033		#6-13 #6-13
C$REVI	= 000003		#6-13 6-65
C$RFLA	= 000021		#6-13
C$RPT	= 000025		#6-13
C$SEFG	= 000046		#6-13
C$SPRI	= 000041		#6-13
C$SVEC	= 000037		#6-13
C$TPRI	= 000013		#6-13
DATA.L	= 013154		#98-2780
DAT.DM	016412		#101-2946 103-3054 348-15380 373-16711 373-16732 397-18014 398-18054 404-18369 405-18405 417-19006 446-20582 446-20619 514-24074 521-24425
DFPTBL	002360	G	#6-119
DIAGMC	= 000000		6-13 6-13
DIVMOD	004264		#33-1091 35-1171 36-1202
DRIVE.	015354		#89-2262 *205-8019 *205-8039 236-9552 236-9565
DROP.C	015402		#89-2276 *203-7936 *204-7972 *204-7976 204-7979
DT.1	015764		#93-2485 526-24707 526-24709 527-24731 529-24840
DUMPER	026302	G	#191-7313 196-7603 196-7622 199-7727 199-7744 209-8208 212-8370 216-8528 219-8672 220-8731 224-8930 224-8939 224-8948 229-9189 229-9198 230-9211 235-9495 235-9506 235-9515 236-9557 243-9901 243-9910 249-10238 250-10262 250-10282 253-10419 256-10575 256-10591 257-10611 261-10818 262-10837 262-10854 262-10871 262-10887 263-10925 263-10930 263-10944 264-10972 264-10977 268-11191 269-11210 269-11227 269-11244 269-11260 270-11298 270-11303 271-11321 271-11345 271-11350 271-11371 275-11588 276-11607 276-11624 276-11641 277-11661 277-11695 277-11700 278-11718 278-11742 278-11747 279-11772 282-11938 283-11958 283-11976 283-11992 284-12013 284-12030 289-12285 290-12354 292-12439 295-12603 300-12835 300-12852 300-12870 301-12906 301-12939 302-12985 306-13192 306-13208 307-13229 307-13262 308-13312 316-13716 316-13730 316-13743 316-13759 317-13779 318-13836 318-13856 319-13913 320-13959 324-14135 324-14157 325-14185 329-14370 329-14385 335-14698 336-14771 342-15048 348-15403 349-15427 349-15451 350-15475 350-15495 355-15776 361-16099 369-16529 374-16801 380-17130 383-17251 391-17675 393-17798 399-18128 400-18154 406-18465 411-18690 418-19077 424-19407 430-19713 430-19748 431-19790 435-20024 440-20290 441-20352 447-20682 453-20951 453-20976 454-20999 458-21212 459-21238 459-21276 460-21302 460-21317 463-21467 466-21590 469-21764 469-21799 472-21966 479-22306 484-22566 488-22808 494-23084 495-23114 496-23186 496-23215 502-23487 503-23518 508-23792 509-23823 515-24170 522-24481 528-24796 528-24811 529-24866 535-25185 536-25245 538-25354 542-25558 547-25797 547-25802 551-25986 557-26345 558-26383 558-26395
D1.TEM	= 013374		#98-2785 *104-3082 *355-15744 *360-16052 367-16403 *368-16457 *374-16759 *380-17092 *382-17209 *398-18077 *405-18428 *417-19028 *447-20649 *478-22274 *515-24129 515-24135 *520-24392 521-24422
D2.TEM	= 013376		#98-2786 *104-3083 *355-15745 *361-16057 367-16404 *368-16458 *374-16760 *380-17093 *382-17210 *398-18078 *406-18433 *417-19029 *447-20650 *478-22275 *515-24130 515-24136 *520-24393 521-24423
EF.CON	= 000036	G	#94-2548
EF.NEW	= 000035	G	#94-2549
EF.PWR	= 000034	G	#94-2550
EF.RES	= 000037	G	#94-2547

SYMBOL	VALUE		REFERENCES								
EF.STA	= 000040	G	#94-2546								
EIG.FM	= 010364		#95-2626								
ELV.FM	= 010466		#95-2629								
ERRBLK	002160	G	#6-96								
ERRMSG	002156	G	#6-96								
ERRNBR	002154	G	#6-96								
ERRTHR	002402	G	#6-161	93-2513	205-8011						
ERRTYP	002152	G	#6-96								
ERR.CH	017442		#110-3367	484-22555	488-22802						
EVL	= 000004	G	#94-2559								
E$END	= 002100		#6-13								
E$LOAD	= 000035		#6-13	6-65							
E2.TEM	= 013400		#98-2787	*104-3084	*355-15746	*361-16058	367-16405	*368-16459	*374-16761	*380-17094	*382-17211
			*398-18079	*406-18434	*417-19030	*447-20651	*478-22276	*515-24131	515-24137	*520-24372	*520-24373
			521-24424								
FIND.C	017660		#112-3475	494-23072	496-23176						
FIRST.	020262		#120-3807	261-10811	268-11184	275-11581	323-14119	341-14076	354-15696	354-15718	381-17164
FIV.FM	= 010304		#95-2623	212-8376	236-9525	256-10581	257-10601	257-10617	261-10824	262-10843	262-10860
			262-10877	263-10897	263-10936	264-10954	264-10983	268-11197	269-11216	269-11233	269-11250
			270-11270	270-11309	271-11327	271-11356	275-11594	276-11613	276-11630	276-11647	277-11667
			277-11706	278-11724	278-11753	283-11949	283-11964	283-11982	284-12003	284-12020	292-12445
			300-12858	301-12912	302-12949	306-13198	306-13215	307-13235	307-13268	308-13318	316-13749
			317-13769	317-13785	324-14141	324-14163	325-14191	355-15782	375-16811	406-18471	435-20030
			440-20296	454-21005	460-21308	463-21473	497-23225	503-23524	509-23829		
FMT.1	= 006442		#95-2593	220-8741	528-24821	538-25364	542-25572	547-25815			
FMT.10	= 007116		#95-2602	335-14711							
FMT.11	= 007170		#95-2603	213-8385							
FMT.12	= 007224		#95-2604	324-14146	324-14168	325-14196					
FMT.13	= 007254		#95-2605	337-14807							
FMT.14	= 007330		#95-2606	393-17809							
FMT.15	= 007370		#95-2607	431-19764							
FMT.16	= 007436		#95-2608	225-8970	230-9229	236-9532	243-9925	289-12303	291-12376	292-12452	319-13922
FMT.17	= 007526		#95-2609	206-8073							
FMT.18	= 007562		#95-2610								
FMT.19	= 007632		#95-2611	484-22577	489-22823	529-24842					
FMT.2	= 006506		#95-2594	219-8690	236-9566	253-10435	342-15067	411-18709	436-20045	537-25263	
FMT.20	= 007702		#95-2612	484-22584	489-22830						
FMT.21	= 007754		#95-2613	494-23094	495-23125	496-23196	497-23231	502-23498	503-23530	508-23803	509-23835
FMT.22	= 010026		#95-2614	516-24184	522-24491						
FMT.23	= 010072		#95-2615	192-7383							
FMT.24	= 010142		#95-2616	192-7390	192-7397	192-7404	193-7415	193-7422	193-7429	193-7436	193-7443
			193-7450	193-7457	193-7464	194-7475	194-7483	194-7492	194-7499		
FMT.25	= 010166		#95-2617	246-10078							
FMT.26	= 010206		#95-2618	246-10088							
FMT.3	= 006574		#95-2595								
FMT.4	= 006620		#95-2596	295-12613							
FMT.5	= 006650		#95-2597	406-18478	430-19728	431-19771	431-19805	479-22325			
FMT.6	= 006752		#95-2598	448-20695							
FMT.7	= 007002		#95-2599	302-12997	350-15511	458-21221	459-21247	460-21289			
FMT.8	= 007030		#95-2600	551-26008	551-26019						
FMT.9	= 007064		#95-2601	308-13277	308-13323	361-16108	441-20363	551-25994			
FNC.1	= 012150		#97-2728	253-10421							

SYMBOL	VALUE	REFERENCES
FNC.10	= 012272	#97-2737 306-13194 306-13210 307-13231 307-13264 308-13314
FNC.11	= 012302	#97-2738 306-13211 316-13731 316-13745 316-13761 317-13781
FNC.12	= 012322	#97-2739 324-14137 324-14159 325-14187
FNC.13	= 012334	#97-2740 381-17143 440-20295 453-20954 453-20979 454-21000
FNC.14	= 012344	#97-2741 355-15777
FNC.15	= 012360	#97-2742 369-16530 391-17680 440-20300
FNC.16	= 012372	#97-2743 374-16803
FNC.17	= 012404	#97-2744 391-17678 393-17801 440-20294 441-20356
FNC.18	= 012414	#97-2745 418-19083 424-19413
FNC.19	= 012426	#97-2746 466-21591
FNC.2	= 012164	#97-2729 256-10577 257-10597 257-10613 300-12872 301-12908
FNC.21	= 012440	#98-2751 335-14704
FNC.22	= 012452	#98-2752 380-17131
FNC.23	= 012464	#98-2753 209-8210 235-9517 292-12441
FNC.3	= 012172	#97-2730 219-8676 220-8734 283-11945 283-11995 284-12016 284-12036 468-21734 472-21967
FNC.4	= 012200	#97-2731 261-10820 262-10873 263-10893 263-10932 264-10950 264-10979 473-21976
FNC.5	= 012216	#97-2732 224-8952 230-9215 268-11193 269-11246 270-11266 270-11305 271-11323 271-11352
		272-11377 289-12289 290-12358 399-18130 400-18156 406-18466 418-19079 430-19715 430-19750
		431-19792 472-21969
FNC.6	= 012226	#97-2733 212-8371 224-8951 230-9214 275-11590 276-11643 277-11663 277-11702 278-11720
		278-11749 279-11774 289-12288 290-12357 335-14699 411-18692 424-19409 435-20028 472-21968
FNC.7	= 012234	#97-2734 283-11944 283-11994 284-12015 284-12035 529-24868
FNC.8	= 012244	#97-2735 295-12604 295-12607 300-12836 300-12853
FNC.9	= 012260	#97-2736
FORCE.	020032	#115-3603 494-23065 495-23163 502-23469 508-23770
FOR.EC	020210	#118-3748 535-25173 536-25216 537-25284 538-25330 546-25747
FOR.FM	= 010270	#95-2622 295-12608 300-12840 300-12876 329-14375 329-14390 337-14794 342-15053 393-17803
		441-20357 453-20956 453-20981 460-21322 466-21595 469-21769 470-21808 479-22311 495-23119
		502-23492 508-23797 528-24801 529-24871 542-25563
F$AU	= 000015	#6-13
F$AUTO	= 000020	#6-13
F$BGN	= 000040	#6-13 6-39 7-229 7-277 7-316 7-348
F$CLEA	= 000007	#6-13
F$DU	= 000016	#6-13
F$END	= 000041	#6-13 6-13 6-13 6-13 6-13 6-13 6-13 6-13 6-13
		6-13 6-13 6-13 6-13 6-13 6-13 6-13 6-13 6-39
		7-250 7-295 7-348
F$HARD	= 000004	#6-13 7-229 7-250
F$HW	= 000013	#6-13 6-119 6-139
F$INIT	= 000006	#6-13
F$JMP	= 000050	#6-13
F$MOD	= 000000	#6-13 6-39 7-348
F$MSG	= 000011	#6-13
F$PROT	= 000021	#6-13 7-316 7-322
F$PWR	= 000017	#6-13
F$RPT	= 000012	#6-13
F$SEG	= 000003	#6-13
F$SOFT	= 000005	#6-13 7-277 7-295
F$SRV	= 000010	#6-13
F$SUB	= 000002	#6-13
F$SW	= 000014	#6-13 6-150 6-165
F$TEST	= 000001	#6-13

SEQ 055

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE		REFERENCES
GD.BLK	020312		#121-3858 398-18041 405-18396 410-18653 411-18674 416-18989 423-19351 423-19368 429-19683 435-19990 435-20007 446-20607 452-20903 452-20925 469-21755 469-21790 470-21817 472-21947 472-21937 477-22237 477-22242 483-22540 488-22791 493-23038 494-23066 495-23164 501-23421 502-23470 507-23722 508-23775 513-24052 515-24154 520-24387 521-24461 527-24735 541-25522 542-25537 546-25750 546-25761
GOOD.B	014006		#88-2241 101-2948 121-3860 *205-8007 *369-16507
G$CNTO	= 000200		#6-13
G$DELM	= 000372		#6-13
G$DISP	= 000003		#6-13
G$EXCP	= 000400		#6-13
G$HILI	= 000002		#6-13
G$LOLI	= 000001		#6-13
G$NO	= 000000		#6-13
G$OFFS	= 000400		#6-13 7-242 7-243 7-244 7-245 7-246 7-247 7-248 7-288 7-289 7-290 7-291 7-292
G$OFSI	= 000376		#6-13 7-242 7-243 7-244 7-245 7-246 7-247 7-248 7-288 7-289 7-290 7-291 7-292
G$PRMA	= 000001		#6-13 7-242
G$PRMD	= 000002		#6-13 7-243 7-244 7-245 7-247
G$PRML	= 000000		#6-13 7-246 7-248 7-288 7-289 7-290 7-291 7-292
G$RADA	= 000140		#6-13
G$RADB	= 000000		#6-13
G$RADD	= 000040		#6-13 7-245
G$RADL	= 000120		#6-13 7-246 7-248 7-288 7-289 7-290 7-291 7-292
G$RADO	= 000020		#6-13 7-242 7-243 7-244 7-247
G$XFER	= 000004		#6-13
G$YES	= 000010		#6-13 7-242 7-243 7-244 7-245 7-246 7-247 7-248 7-288 7-289 7-290 7-291 7-292
HELP	= 000000		#6-4 6-8 6-30 6-48 6-67 6-105 6-121 6-152 #7-170 7-231 7-252 7-279 7-298 7-324 7-341 7-351
HOE	= 100000	G	#94-2572
HW.OR.	013402		#88-2234 *341-14991 342-15035
IBE	= 010000	G	#94-2569
IDU	= 000040	G	#94-2562
IER	= 020000	G	#94-2570
INTER	= 013114		#98-2779 196-7602 196-7621 199-7726 199-7743 219-8671 271-11370 279-11771 335-14697 369-16528 380-17129 391-17674 400-18153 440-20289
INTERV	002410	G	#6-164 93-2512 315-13690 556-26269
IO.BUF	014022		#89-2253 101-2949 113-3492 *113-3493 120-3810 121-3861 122-3911 *317-13795 317-13803 *320-13938 320-13945 360-16004 360-16028 366-16376 367-16429 389-17547 392-17712 *398-18039 *405-18395 *410-18652 *411-18670 411-18681 416-18945 422-19309 *423-19359 424-19389 *429-19677 *429-19678 *434-19980 *434-19981 *435-19998 435-20015 *439-20242 439-20255 440-20268 *440-20316 441-20323 *441-20334 441-20339 *445-20568 *445-20572 *445-20573 *445-20574 *452-20902 *452-20917 453-20943 453-20968 458-21199 463-21457 465-21576 *469-21752 *469-21774 *470-21816 *472-21946 *483-22511 *483-22534 *484-22597 *488-22787 *493-23037 *494-23059 494-23102 *495-23157 496-23207 *501-23420 *502-23463 502-23506 *507-23721 *508-23764 508-23811 *513-24043 515-24162 *520-24383 522-24473 535-25176 536-25230 537-25286 538-25332 *541-25521 *546-25749 550-25969 *556-26282 556-26290 558-26365
ISR	= 000100	G	#94-2563
IXE	= 004000	G	#94-2568
I$AU	= 000041		#6-13
I$AUTO	= 000041		#6-13

SYMBOL	VALUE		REFERENCES
I$CLN	= 000041		#6-13
I$DU	= 000041		#6-13
I$HRD	= 000041		#7-229 #7-250
I$INIT	= 000041		#6-13
I$MOD	= 000041		#6-13 6-39 #6-39 7-348 #7-348
I$MSG	= 000041		#6-13
I$PROT	= 000040		#6-13 #7-316
I$PTAB	= 000041		#6-13
I$PWR	= 000041		#6-13
I$RPT	= 000041		#6-13
I$SEG	= 000041		#6-13
I$SETU	= 000041		#6-13
I$SFT	= 000041		#7-277 #7-295
I$SRV	= 000041		#6-13
I$SUB	= 000041		#6-13
I$TST	= 000041		#6-13
J$JMP	= 000167		#6-13
LAST.B	020344		#122-3908 379-17042 379-17064 381-17182 459-21265
LAU	004704		#44-188 44-206
LAUTO	004660		#42-87 42-105
LCLEAN	113536		#560-26478 561-26502
LDU	004672		#43-136 43-154
LD.LNG	021354		#133-4443 367-16398 515-24134 521-24421
LIMIT	015400		#89-2275 *205-8013 *205-8015 212-8365 224-8919 229-9178 235-9480 242-9886 289-12278 290-12347 292-12432 307-13257 308-13307 324-14130 324-14152 324-14176 335-14693 342-15043 348-15398 349-15422 349-15446 350-15470 350-15490 406-18458 411-18685 418-19070 424-19402 430-19708 430-19743 431-19785 447-20675 453-20946 453-20971 458-21207 459-21233 463-21462 478-22295 484-22559 494-23077 494-23105 496-23181 496-23210 502-23480 502-23509 508-23785 509-23818 515-24165 522-24476 536-25238 538-25347 551-25981
LINIT	027650		#203-7927 206-8101
LOAD.S	016034		#98-2795 104-3111
LOE	= 040000	G	#94-2571
LOT	= 000010	G	#94-2560
LRPT	004646		#41-34 41-52
LST.AR	014020		#89-2252 *205-8009 *205-8029 *205-8030 *206-8055 *206-8056 307-13242 308-13291 359-15983 369-16513 369-16522 440-20279 440-20283 535-25200
LST.BL	014014		#89-2250 122-3910 *205-8010 *205-8035 *205-8036 *205-8037 *206-8063 *206-8064 *206-8065 317-13807 320-13952 381-17151 458-21185 459-21269 460-21288 463-21447 465-21577 535-25174 536-25223 537-25287 537-25304 538-25327 550-25958 557-26298 558-26376
LST.DU	015356		#89-2264 194-7487 *206-8069 *206-8071 212-8338
L$ACP	002110	G	#6-65
L$APT	002036	G	#6-65
L$AU	004706	G	6-65 #44-206
L$AUT	002070	G	#6-65
L$AUTO	004662	G	6-65 #42-105
L$CCP	002106	G	#6-65
L$CLEA	113546	G	6-65 #560-26497
L$CO	002032	G	#6-65
L$DEPO	002011	G	#6-65
L$DESC	002130	G	6-65 #6-87
L$DESP	002076	G	#6-65
L$DEVP	002060	G	#6-65

SYMBOL	VALUE		REFERENCES
L$DISP	002164	G	6-65 #6-103
L$DLY	002116	G	#6-65 103-3031 103-3058 103-3071 209-8196 212-8355 216-8516 220-8711 256-10563 263-10904 270-11277 277-11674 282-11926 328-14354 334-14633 341-14982 341-15006 341-15019 354-15701 354-15722 355-15737 360-16010 360-16033 360-16045 367-16410 367-16433 368-16450 373-16716 373-16736 374-16752 379-17047 379-17068 380-17085 381-17186 382-17202 389-17553 392-17718 397-18019 398-18058 398-18070 405-18378 405-18409 405-18421 417-19010 417-19021 446-20587 446-20623 447-20642 478-22251 478-22267 514-24078 515-24141 521-24429 557-26316 557-26333
L$DTP	002040	G	#6-65
L$DTYP	002034	G	#6-65
L$DU	004674	G	6-65 #43-154
L$DUT	002072	G	#6-65
L$DVTY	002122	G	6-65 #6-80
L$EF	002052	G	#6-65
L$ENVI	002044	G	#6-65
L$ERRT	002152	G	6-65 #6-96
L$ETP	002102	G	#6-65
L$EXP1	002046	G	#6-65
L$EXP4	002064	G	#6-65
L$EXP5	002066	G	#6-65
L$HARD	002414	G	6-65 7-229 #7-229
L$HIME	002120	G	#6-65
L$HPCP	002016	G	#6-65
L$HPTP	002022	G	#6-65
L$HW	002360	G	6-65 6-119 #6-119
L$ICP	002104	G	#6-65
L$INIT	030714	G	6-65 #206-8101
L$LADP	002026	G	#6-65
L$LAST	= 113562	G	6-65 #561-26527
L$LOAD	002100	G	#6-65
L$LUN	002074	G	#6-65
L$MREV	002050	G	#6-65
L$NAME	002000	G	#6-65
L$PRIO	002042	G	#6-65
L$PROT	003444	G	6-65 #7-316
L$PRT	002112	G	#6-65
L$REPP	002062	G	#6-65
L$REV	002010	G	#6-65
L$RPT	004650	G	6-65 #41-52
L$SOFT	003122	G	6-65 7-277 #7-277
L$SPC	002056	G	#6-65
L$SPCP	002020	G	#6-65
L$SPTP	002024	G	#6-65
L$STA	002030	G	#6-65
L$SW	002400	G	6-65 6-150 #6-150
L$TEST	002114	G	#6-65
L$TIML	002014	G	#6-65
L$UNIT	002012	G	#6-65 203-7920 204-7942 204-7987
L10000	002376		6-119 #6-139
L10001	002412		6-150 #6-165
L10002	002510		7-229 #7-250
L10003	003160		7-277 #7-295

SYMBOL	VALUE	REFERENCES								
MB.DIS	= 005570	#95-2585	319-13914							
MEM.AR	= 013052	#98-2778								
ML.DUT	016032	#93-2509	103-3049	104-3120	169-6292	170-6317	173-6482	174-6507	178-6695	179-6723
		196-7586	199-7713	*205-8002	206-8078	209-8188	212-8348	216-8509	219-8661	219-8665
		219-8667	219-8683	219-8689	220-8702	220-8721	220-8726	220-8740	223-8898	229-9161
		234-9446	235-9468	240-9769	249-10227	250-10252	250-10272	253-10401	256-10556	261-10806
		263-10916	264-10963	268-11179	270-11289	271-11336	275-11576	277-11686	278-11733	282-11918
		289-12261	290-12330	291-12403	295-12587	299-12806	299-12813	299-12820	300-12884	301-12895
		301-12921	301-12928	302-12963	302-12967	302-12974	306-13181	307-13248	308-13298	315-13700
		317-13811	323-14114	328-14336	333-14606	340-14966	341-14997	347-15328	354-15688	354-15713
		359-15991	360-16022	366-16369	367-16422	373-16702	373-16728	379-17033	379-17059	381-17158
		381-17177	389-17539	392-17705	397-18006	398-18035	398-18047	404-18362	405-18390	405-18401
		410-18647	411-18663	416-18985	417-18998	422-19299	423-19564	423-19373	429-19668	434-19971
		435-20003	439-20247	440-20310	441-20329	445-20560	446-20599	446-20612	452-20897	452-20910
		458-21193	459-21260	462-21451	465-21571	468-21743	469-21785	472-21941	472-21952	477-22206
		483-22536	487-22762	493-23047	495-23149	501-23452	507-23753	513-24048	513-24057	515-24150
		520-24376	521-24457	526-24695	529-24857	535-25165	536-25208	537-25276	538-25320	538-25339
		541-25512	542-25533	546-25739	546-25757	550-25963	556-26278	557-26301		
ML.LUN	016030	#93-2508	196-7609	197-7632	199-7733	199-7750	*203-7935	*204-7941	204-7942	204-7945
		204-7981	*204-7985	*204-7986	204-7987	204-7990	206-8072	209-8223	213-8399	216-8541
		225-8989	230-9253	236-9573	243-9948	264-10995	272-11389	279-11786	292-12472	337-14819
		342-15082	356-15790	362-16124	369-16537	375-16815	400-18144	407-18501	412-18727	419-19120
		424-19437	432-19835	436-20060	441-20367	448-20721	479-22343	485-22612	489-22844	
ML.REG	015404	#89-2278	101-2947	101-2948	101-2949	101-2950	103-3048	103-3051	103-3052	103-3055
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SYMBOL VALUE REFERENCES

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MSGH6		003004		7-247	#7-264							
MSGH7		003052		7-248	#7-265							
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MSGS3		003270		7-290	#7-306							
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P.AAI	005570		#68-1113	95-2585							
P.AAJ	005652		#69-1134	95-2586							
P.AAK	005722		#69-1148	95-2587							
P.AAL	005764		#69-1160	95-2588							
P.AAM	006060		#70-1184	95-2589							
P.AAN	006150		#70-1203	95-2590							
P.AAO	006242		#70-1223	95-2591							
P.AAP	006334		#71-1247	95-2592							
P.AAQ	006442		#71-1271	95-2593							
P.AAR	006506		#71-1283	95-2594							
P.AAS	006574		#72-1305	95-2595							
P.AAT	006620		#72-1312	95-2596							
P.AAU	006650		#72-1320	95-2597							

SYMBOL	VALUE	REFERENCES	
P.AAV	006752	#72-1342	95-2598
P.AAW	007002	#73-1354	95-2599
P.AAX	007030	#73-1362	95-2600
P.AAY	007064	#73-1372	95-2601
P.AAZ	007116	#73-1381	95-2602
P.ABA	007170	#73-1395	95-2603
P.ABB	007224	#74-1409	95-2604
P.ABC	007254	#74-1417	95-2605
P.ABD	007330	#74-1432	95-2606
P.ABE	007370	#74-1443	95-2607
P.ABF	007436	#74-1456	95-2608
P.ABG	007526	#75-1479	95-2609
P.ABH	007562	#75-1489	95-2610
P.ABI	007632	#75-1503	95-2611
P.ABJ	007702	#76-1521	95-2612
P.ABK	007754	#76-1535	95-2613
P.ABL	010026	#76-1549	95-2614
P.ABM	010072	#76-1561	95-2615
P.ABN	010142	#77-1579	95-2616
P.ABO	010166	#77-1586	95-2617
P.ABP	010206	#77-1592	95-2618
P.ABQ	010240	#77-1601	95-2619
P.ABR	010246	#77-1603	95-2620
P.ABS	010256	#77-1606	95-2621
P.ABT	010270	#77-1610	95-2622
P.ABU	010304	#77-1614	95-2623
P.ABV	010322	#77-1619	95-2624
P.ABW	010342	#77-1625	95-2625
P.ABX	010364	#78-1635	95-2626
P.ABY	010410	#78-1642	95-2627
P.ABZ	010436	#78-1650	95-2628
P.ACA	010466	#78-1658	95-2629
P.ACB	010520	#78-1667	95-2630
P.ACC	010524	#78-1669	95-2631
P.ACD	010536	#78-1673	95-2632
P.ACE	010544	#78-1675	95-2633
P.ACF	010552	#78-1677	95-2634
P.ACG	010560	#78-1679	96-2639
P.ACH	010566	#78-1681	96-2640
P.ACI	010602	#79-1689	96-2641
P.ACJ	010616	#79-1693	96-2642
P.ACK	010630	#79-1697	96-2643
P.ACL	010640	#79-1700	96-2644
P.ACM	010650	#79-1703	96-2645
P.ACN	010660	#79-1706	96-2646
P.ACO	010664	#79-1708	96-2647
P.ACP	010676	#79-1712	96-2648
P.ACQ	010704	#79-1714	96-2649
P.ACR	010712	#79-1716	96-2650
P.ACS	010724	#79-1720	96-2651
P.ACT	010730	#79-1722	96-2652
P.ACU	010736	#79-1724	96-2653

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES	
P.ACV	010744	#79-1726	96-2654
P.ACW	010752	#79-1728	96-2655
P.ACX	010766	#79-1732	96-2656
P.ACY	010774	#79-1734	96-2657
P.ACZ	011002	#79-1736	96-2658
P.ADA	011016	#80-1744	96-2659
P.ADB	011024	#80-1746	96-2660
P.ADC	011032	#80-1748	96-2661
P.ADD	011046	#80-1752	96-2662
P.ADE	011054	#80-1754	96-2663
P.ADF	011070	#80-1758	96-2664
P.ADG	011076	#80-1760	96-2665
P.ADH	011102	#80-1762	96-2666
P.ADI	011110	#80-1764	96-2667
P.ADJ	011116	#80-1766	96-2668
P.ADK	011122	#80-1768	96-2669
P.ADL	011132	#80-1771	96-2670
P.ADM	011140	#80-1773	96-2671
P.ADN	011150	#80-1776	96-2672
P.ADO	011154	#80-1778	96-2673
P.ADP	011170	#80-1782	96-2674
P.ADQ	011176	#80-1784	96-2675
P.ADR	011206	#80-1787	96-2676
P.ADS	011214	#80-1789	96-2677
P.ADT	011226	#80-1793	96-2678
P.ADU	011240	#81-1801	96-2679
P.ADV	011250	#81-1804	96-2680
P.ADW	011260	#81-1807	96-2681
P.ADX	011270	#81-1810	96-2682
P.ADY	011276	#81-1812	96-2683
P.ADZ	011310	#81-1816	96-2684
P.AEA	011316	#81-1818	96-2685
P.AEB	011326	#81-1821	96-2686
P.AEC	011336	#81-1824	96-2687
P.AED	011344	#81-1826	96-2688
P.AEE	011352	#81-1828	96-2689
P.AEF	011362	#81-1831	96-2690
P.AEG	011374	#81-1835	97-2695
P.AEH	011400	#81-1837	97-2696
P.AEI	011416	#81-1842	97-2697
P.AEJ	011432	#81-1846	97-2698
P.AEK	011440	#81-1848	97-2699
P.AEL	011446	#81-1850	97-2700
P.AEM	011454	#82-1856	97-2701
P.AEN	011462	#82-1858	97-2702
P.AEO	011470	#82-1860	97-2703
P.AEP	011474	#82-1862	97-2704
P.AEQ	011502	#82-1864	97-2705
P.AER	011514	#82-1868	97-2706
P.AES	011524	#82-1871	97-2707
P.AET	011532	#82-1873	97-2708
P.AEU	011540	#82-1875	97-2709

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES	
P.AEV	011552	#82-1879	97-2710
P.AEW	011562	#82-1882	97-2711
P.AEX	011570	#82-1884	97-2712
P.AEY	011610	#82-1890	97-2713
P.AEZ	011626	#82-1895	97-2714
P.AFA	011644	#82-1900	97-2715
P.AFB	011676	#83-1913	97-2716
P.AFC	011714	#83-1918	97-2717
P.AFD	011726	#83-1922	97-2718
P.AFE	011740	#83-1926	97-2719
P.AFF	011762	#83-1932	97-2720
P.AFG	011774	#83-1936	97-2721
P.AFH	012006	#83-1940	97-2722
P.AFI	012020	#83-1944	97-2723
P.AFJ	012036	#83-1949	97-2724
P.AFK	012060	#83-1955	97-2725
P.AFL	012104	#83-1962	97-2726
P.AFM	012136	#84-1975	97-2727
P.AFN	012150	#84-1979	97-2728
P.AFO	012164	#84-1983	97-2729
P.AFP	012172	#84-1985	97-2730
P.AFQ	012200	#84-1987	97-2731
P.AFR	012216	#84-1992	97-2732
P.AFS	012226	#84-1995	97-2733
P.AFT	012234	#84-1997	97-2734
P.AFU	012244	#84-2000	97-2735
P.AFV	012260	#84-2004	97-2736
P.AFW	012272	#84-2008	97-2737
P.AFX	012302	#84-2011	97-2738
P.AFY	012322	#84-2017	97-2739
P.AFZ	012334	#85-2025	97-2740
P.AGA	012344	#85-2028	97-2741
P.AGB	012360	#85-2032	97-2742
P.AGC	012372	#85-2036	97-2743
P.AGD	012404	#85-2040	97-2744
P.AGE	012414	#85-2043	97-2745
P.AGF	012426	#85-2047	97-2746
P.AGG	012440	#85-2051	98-2751
P.AGH	012452	#85-2055	98-2752
P.AGI	012464	#85-2059	98-2753
P.AGJ	012500	#85-2063	98-2754
P.AGK	012510	#85-2066	98-2755
P.AGL	012516	#85-2068	98-2756
P.AGM	012524	#85-2070	98-2757
P.AGN	012532	#85-2072	98-2758
P.AGO	012540	#85-2074	98-2759
P.AGP	012546	#86-2080	98-2760
P.AGQ	012554	#86-2082	98-2761
P.AGR	012562	#86-2084	98-2762
P.AGS	012570	#86-2086	98-2763
P.AGT	012576	#86-2088	98-2764
P.AGU	012604	#86-2090	98-2765

SYMBOL	VALUE	REFERENCES								
P.AGV	012612	#86-2092	98-2766							
P.AGW	012620	#86-2094	98-2767							
P.AGX	012626	#86-2096	98-2768							
P.AGY	012634	#86-2098	98-2769							
P.AGZ	012642	#86-2100	98-2770							
P.AHA	012652	#86-2103	98-2771							
P.AHB	012660	#86-2105	98-2772							
P.AHC	012666	#86-2107	98-2773							
P.AHD	012676	#86-2110	98-2774							
P.AHE	012706	#86-2113	98-2775							
P.AHF	012750	#86-2125	98-2776							
P.AHG	013012	#87-2141	98-2777							
P.AHH	013052	#87-2152	98-2778							
P.AHI	013114	#87-2164	98-2779							
P.AHJ	013154	#87-2175	98-2780							
P.AHK	013214	#87-2186	98-2781							
P.AHL	013250	#88-2200	98-2782							
P.AHM	013302	#88-2209	98-2783							
P.AHN	013330	#88-2217	98-2784							
P.CAL	015366	#89-2270	108-3277	*108-3278	*108-3279	111-3406	*483-22549	484-22581	*488-22800	489-22827
P.CNT	015376	#89-2274	*212-8336	*212-8364	212-8365	*223-8891	*224-8918	224-8919	*229-9153	*229-9177
		229-9178	*234-9438	*235-9479	235-9480	*240-9766	*242-9885	242-9886	*288-12252	*289-12277
		289-12278	*290-12346	290-12347	*292-12431	292-12432	*307-13241	*307-13256	307-13257	*308-13288
		*308-13306	308-13307	*323-14105	*324-14129	324-14130	*324-14151	324-14152	*324-14175	324-14176
		*333-14604	*335-14692	335-14693	*340-14964	*342-15042	342-15043	*347-15323	*348-15397	348-15398
		*349-15421	349-15422	*349-15445	349-15446	*350-15469	350-15470	*350-15489	350-15490	*404-18355
		*406-18457	406-18458	*410-18641	*411-18684	411-18685	*415-18934	*418-19069	418-19070	*422-19297
		*424-19401	424-19402	*429-19665	*430-19707	430-19708	*430-19742	430-19743	*431-19784	431-19785
		*445-20557	*447-20674	447-20675	*452-20895	*453-20945	453-20946	*453-20970	453-20971	*458-21184
		*458-21206	458-21207	*459-21232	459-21233	*463-21446	*463-21461	463-21462	*477-22200	*478-22294
		478-22295	*483-22507	*484-22558	484-22559	*493-23035	*494-23076	494-23077	*494-23104	494-23105
		*496-23180	496-23181	*496-23209	496-23210	*501-23418	*502-23479	502-23480	*502-23508	502-23509
		*507-23719	*508-23784	508-23785	*509-23817	509-23818	*513-24037	*515-24164	515-24165	*520-24371
		*522-24475	522-24476	*535-25162	*536-25237	536-25238	*538-25346	538-25347	*550-25957	*550-25976
		551-25981								
P.GEN	015374	#89-2273	111-3378	111-3406	*483-22546	484-22574	*488-22797	488-22816		
RAS.IN	015346	#89-2259	*205-8021	*205-8041	369-16509	439-20243	439-20253			
RD.CS1	021762	#137-4661	189-7216	242-9847						
RD.DA	022316	#143-4980	189-7226	242-9861						
RD.DAT	015352	#89-2261	*137-4676	137-4677	*140-4836	140-4837	*143-4995	143-4996	*146-5155	146-5156
		*149-5316	149-5317	*152-5478	152-5479	*156-5664	156-5665	*160-5852	160-5853	*163-5990
		163-5991	*166-6125	166-6126	*170-6312	170-6313	*174-6502	174-6503	*179-6717	179-6718
		*182-6877	182-6878	225-8963	230-9222	236-9529	243-9918	289-12296	290-12365	292-12449
		319-13919								
RD.DS	025216	#182-6862	190-7270							
RD.D1	024104	#169-6283	190-7275							
RD.D2	024416	#173-6473	190-7280							
RD.D3	024744	#178-6685	190-7285							
RD.EE	023760	#166-6123	189-7256							
RD.EL	023716	#163-5988	189-7261							
RD.ER	022140	#140-4821	189-7221	242-9854						
RD.E1	023074	#152-5462	189-7236	242-9875						

SYMBOL		VALUE		REFERENCES								
RD.E2		023314		#156-5647	189-7241	242-9882						
RD.MR		022474		#146-5140	189-7231							
RD.PA		022666		#149-5300	189-7246	242-9868						
RD.PD		023556		#160-5835	189-7251							
RD.REG		025712		#188-7189	224-8915	229-9174	235-9476	289-12274	290-12343	292-12428	319-13907	
REGDMP		002404	G	#6-162	93-2512	192-7375						
REG.IN		015360		#89-2266	169-6289	173-6479	178-6692	*291-12397	*291-12419	*292-12469		
REG.1	=	012500		#98-2754	192-7389							
REG.10	=	012570		#98-2763								
REG.11	=	012576		#98-2764								
REG.12	=	012604		#98-2765								
REG.13	=	012612		#98-2766								
REG.14	=	012620		#98-2767	194-7474	528-24814	529-24870					
REG.15	=	012626		#98-2768	194-7482	535-25188	536-25247	538-25357				
REG.16	=	012634		#98-2769								
REG.17	=	012642		#98-2770	193-7421	209-8211						
REG.18	=	012652		#98-2771	192-7396							
REG.19	=	012660		#98-2772	192-7403							
REG.2	=	012510		#98-2755	193-7428	300-12857						
REG.20	=	012666		#98-2773	194-7491							
REG.21	=	012676		#98-2774	194-7498							
REG.3	=	012516		#98-2756	193-7435	284-12031						
REG.4	=	012524		#98-2757	193-7449							
REG.5	=	012532		#98-2758	193-7442	301-12940	302-12987					
REG.6	=	012540		#98-2759	193-7414	219-8673	459-21241	460-21283	460-21303			
REG.7	=	012546		#98-2760	193-7456	236-9559						
REG.8	=	012554		#98-2761								
REG.9	=	012562		#98-2762	193-7463							
REM.TB		015664		#92-2448	108-3275	108-3281	108-3287	115-3622	115-3626	115-3632		
RE2		004640		39-1349	#39-1379							
RE3		004636		39-1357	#39-1378							
RE4		004634		39-1366	#39-1377							
RH.ADD		016022		#93-2505	*204-7950	204-7961						
RH.ERR	=	013302		#98-2783	209-8207	212-8369						
RH.TYP		016024		#93-2506	*204-7952							
RH.VEC		016026		#93-2507	*204-7954							
SC.SET	=	013214		#98-2781								
SEV.FM	=	010342		#95-2625	391-17683	399-18136	411-18698					
SFPTBL		002400	G	#6-150								
SIX.FM	=	010322		#95-2624	219-8679	224-8955	230-9218	272-11382	279-11779	284-12037	289-12292	290-12361
				302-12992	335-14705	337-14784	349-15414	349-15434	349-15458	350-15482	350-15502	400-18161
				418-19084	424-19414	430-19720	430-19755	431-19797	473-21977			
STACK		015034		#89-2255	*100-2885	*100-2886	*100-2898	*100-2899	107-3235	111-3377	429-19701	430-19726
				430-19739	431-19769	431-19782	431-19803					
STK.OF		015022		#89-2254	98-2798	*103-3044	104-3103	*104-3107				
STRIPP		016444		#103-3038	107-3228	429-19689						
SVCGBL	=	177777		#6-13	#6-22	6-65	6-65	6-65	6-65	6-65	6-65	6-65
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SYMBOL VALUE REFERENCES

6-65 6-65 6-65 6-65 6-65 6-65 6-65 6-65 6-65
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SVCTAG = 177777 #6-13 #6-23 6-139 6-139 6-139 6-165 6-165 6-165 7-250
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SVCTST = 177777 #6-13 #6-20
SYNC = 012750 #98-2776 224-8938 229-9197 235-9505 263-10929 264-10976 270-11302 271-11349 277-11699
278-11746 329-14384 399-18127 406-18464 411-18689 430-19712 430-19747 431-19789 435-20023
453-20950 453-20975 454-20998 466-21589 469-21763 469-21798 479-22305 484-22565 488-22807
494-23083 495-23113 496-23185 496-23214 502-23486 503-23517 508-23791 509-23822 515-24169
522-24480 528-24810 529-24865 535-25184 538-25353 542-25557 547-25796

S$LSYM = 010000 #6-13 #6-139 #6-165 #7-250 #7-295
TEN.FM = 010436 #95-2628
THR.FM = 010256 #95-2621 209-8212 220-8735 243-9914 250-10246 250-10266 250-10286 361-16103 369-16533
381-17138 383-17255 440-20303 447-20686 458-21216 459-21242 460-21284 468-21735 484-22570
488-22812 494-23088 496-23190 516-24178 522-24485 528-24815 535-25189 538-25358 547-25806

TIME.O = 013330 #98-2784
TRBLE. = 013250 #98-2782 472-21965
TST.LN 020376 #125-4047 355-15752 361-16078 368-16480 374-16781 380-17114 382-17231 418-19066 447-20671
478-22291

TWO.FM = 010246 #95-2620 236-9560 251-10302 253-10422 316-13733 381-17144 536-25248 551-25989
T$ARGC = 000002 #6-65 6-65 #6-65 6-65 6-65 #6-65 6-65 6-65 #6-65
6-65 6-65 #6-65 6-65 6-65 #6-65 6-65 6-65

T$CODE = 004130 #7-242 7-242 #7-242 7-242 #7-242 7-242 #7-243 7-243 #7-243

SYMBOL VALUE REFERENCES

		7-243	#7-243	7-243	#7-244	7-244	#7-244	7-244	#7-244	7-244
		#7-245	7-245	#7-245	7-245	#7-245	7-245	#7-246	7-246	#7-246
		7-246	#7-246	7-246	#7-247	7-247	#7-247	#7-247	7-247	7-247
		#7-248	7-248	#7-248	7-248	#7-248	7-248	#7-288	7-288	#7-288
		7-288	#7-288	7-288	#7-289	7-289	#7-289	7-289	#7-289	7-289
		#7-290	7-290	#7-290	7-290	#7-290	7-290	#7-291	7-291	#7-291
		7-291	#7-291	7-291	#7-292	7-292	#7-292	7-292	#7-292	7-292
T$ERRN	= 000000	#6-13								
T$EXCP	= 000000	#7-242	7-242	#7-243	7-243	#7-244	7-244	#7-245	7-245	#7-247
		7-247								
T$FREE	113562 G	561-26522	561-26523	#561-26524						
T$GMAN	= 000000	#6-13								
T$HILI	= 000007	#7-242	7-242	#7-243	7-243	#7-244	7-244	#7-245	7-245	#7-247
		7-247								
T$LAST	= 000000	#6-13								
T$LOLI	= 000000	#7-242	7-242	#7-243	7-243	#7-244	7-244	#7-245	7-245	#7-247
		7-247								
T$LSYM	= 010000	#6-13	6-13	6-139	6-165	7-250	7-295			
T$NEST	= 177777	#6-13	6-39	#6-39	6-39	6-119	#6-119	6-119	6-139	6-139
		6-139	#6-139	6-150	#6-150	6-150	6-165	6-165	6-165	#6-165
		7-229	#7-229	7-229	7-250	7-250	7-250	#7-250	7-277	#7-277
		7-277	7-295	7-295	7-295	#7-295	7-316	#7-316	7-316	7-322
		7-322	7-322	#7-322	7-348	7-348	7-348	#7-348		
T$NS0	= 000000	#6-39	7-348							
T$NS1	= 000021	#6-119	6-139	#6-150	6-165	#7-229	7-250	#7-277	7-295	#7-316
		7-322								
T$PTHV	= 000000 G	6-65	#561-26528							
T$PTNU	= 000000	#6-13								
T$SAVL	= 177777	#6-13								
T$SEGL	= 177777	#6-13								
T$SUBN	= 000000	#6-13								
T$TAGL	= 177777	#6-13								
T$TAGN	= 010005	#6-13	6-119	6-119	#6-119	6-150	6-150	#6-150	7-229	7-229
		#7-229	7-277	7-277	#7-277	7-316	7-316	#7-316		
T$TEMP	= 000000	#6-103	6-103	6-103	#6-103	6-103	6-103	#6-103	6-103	6-103

SYMBOL VALUE REFERENCES

		#6-103	6-103	6-103	#6-103	6-103	6-103	#6-103	6-103	6-103
		#6-103	6-103	6-103	#6-103	6-103	6-103	#6-103	6-103	6-103
		#6-103	6-103	6-103	#6-103	#6-139	6-139	#6-165	6-165	#7-242
		7-242	#7-242	7-242	#7-242	7-242	#7-243	7-243	#7-243	7-243
		#7-243	7-243	#7-244	7-244	#7-244	7-244	#7-244	7-244	#7-245
		7-245	#7-245	7-245	#7-245	7-245	#7-246	7-246	#7-246	7-246
		#7-246	7-246	#7-247	7-247	#7-247	7-247	#7-247	7-247	#7-248
		7-248	#7-248	7-248	#7-248	7-248	#7-250	7-250	#7-288	7-288
		#7-288	7-288	#7-288	7-288	#7-289	7-289	#7-289	7-289	#7-289
		7-289	#7-290	7-290	#7-290	7-290	#7-290	7-290	#7-291	7-291
		#7-291	7-291	#7-291	7-291	#7-292	7-292	#7-292	7-292	#7-292
		7-292	#7-295	7-295	#7-322	7-322	#7-348	7-348		

T$TEST	= 000000		#6-13		
T$TSTM	= 177777		#6-13		
T$TSTS	= 000000		#6-13		
T$$HAR	= 010002		#7-229	7-229	7-250
T$$HW	= 010000		#6-119	6-119	6-139
T$$PRO	= 010004		#7-316		
T$$SOF	= 010003		#7-277	7-277	7-295
T$$SW	= 010001		#6-150	6-150	6-165
T.21	= 004716		#94-2573	315-13693	
T.61	= 005012		#94-2574	556-26272	
T1	031134	G	6-103	#210-8249	
T10	036266	G	6-103	#251-10325	
T11	036510	G	6-103	#254-10464	
T12	037066	G	6-103	#257-10645	
T13	040230	G	6-103	#265-11021	
T14	041462	G	6-103	#272-11411	
T15	042714	G	6-103	#279-11808	
T16	043556	G	6-103	#285-12070	
T17	045044	G	6-103	#293-12498	
T18	045260	G	6-103	#296-12647	
T19	046430	G	6-103	#303-13033	
T2	031460	G	6-103	#213-8421	
T20	047430	G	6-103	#309-13356	
T21	051176	G	6-103	#321-13995	
T22	051724	G	6-103	#325-14231	
T23	052262	G	6-103	#330-14424	
T24	053456	G	6-103	#338-14843	
T25	054270	G	6-103	#343-15108	
T26	055466	G	6-103	#351-15546	
T27	056244	G	6-103	#356-15813	
T28	057230	G	6-103	#362-16150	
T29	060342	G	6-103	#370-16564	
T3	031666	G	6-103	#217-8565	
T30	061136	G	6-103	#375-16838	
T31	062534	G	6-103	#383-17289	
T32	064272	G	6-103	#394-17844	
T33	065304	G	6-103	#400-18185	
T34	066266	G	6-103	#407-18528	
T35	066744	G	6-103	#412-18755	
T36	070030	G	6-103	#419-19142	

SYMBOL		VALUE		REFERENCES								
T37		070756	G	6-103	#425-19463							
T38		072032	G	6-103	#432-19857							
T39		072460	G	6-103	#436-20081							
T4		032336	G	6-103	#221-8773							
T40		073436	G	6-103	#442-20393							
T41		074516	G	6-103	#448-20743							
T42		075324	G	6-103	#454-21035							
T43		076254	G	6-103	#461-21352							
T44		076504	G	6-103	#464-21506							
T45		076670	G	6-103	#466-21618							
T46		077366	G	6-103	#470-21843							
T47		077660	G	6-103	#473-22004							
T48		100640	G	6-103	#480-22367							
T49		101376	G	6-103	#485-22634							
T5		033006	G	6-103	#225-9011							
T50		102014	G	6-103	#489-22865							
T51		103202	G	6-103	#497-23266							
T52		104020	G	6-103	#504-23572							
T53		104660	G	6-103	#510-23877							
T54		105722	G	6-103	#516-24223							
T55		106612	G	6-103	#523-24530							
T56		107742	G	6-103	#530-24905							
T57		111234	G	6-103	#539-25401							
T58		111640	G	6-103	#543-25605							
T59		112306	G	6-103	#548-25849							
T6		033476	G	6-103	#231-9279							
T60		112660	G	6-103	#552-26052							
T61		113522	G	6-103	#559-26426							
T7		034354	G	6-103	#237-9599							
T8		035370	G	6-103	#244-9974							
T9		035624	G	6-103	#247-10114							
UAM	=	000200	G	#94-2564								
UNS.ER	=	005272		#94-2577	318-13837							
VV.CLE	=	005414		#95-2583	316-13717							
VV.NOT	=	005340		#94-2578	316-13732							
VV.SET	=	005764		#95-2588	318-13857							
WC.ERR	=	005652		#95-2586	196-7604	196-7623						
WRD.1	=	010520		#95-2630	256-10580	261-10823	262-10839	262-10856	263-10935	264-10982	268-11196	269-11212
				269-11229	270-11308	271-11355	275-11593	276-11609	276-11626	277-11705	278-11752	283-11948
				283-11960	283-11978	306-13197	316-13748	324-14140				
WRD.10	=	010630		#96-2643	243-9911	335-14703	361-16100	383-17252	393-17799	406-18468	411-18695	418-19081
				424-19411	447-20683	453-20952	453-20977	463-21468	473-21975	479-22307	502-23490	508-23795
				528-24799	538-25355	542-25561	547-25803					
WRD.11	=	010640		#96-2644	256-10578	257-10598	257-10614	263-10933	264-10951	264-10980	270-11306	271-11324
				271-11353	277-11703	278-11721	278-11750	283-11946	300-12837	300-12854	300-12873	301-12909
				301-12942	302-12989	306-13195	306-13212	316-13746	316-13762	317-13782	324-14138	324-14160
				329-14372	329-14387	454-21002	460-21305	460-21319	463-21470	466-21592		
WRD.12	=	010650		#96-2645	212-8373	219-8677	224-8953	230-9216	235-9519	261-10821	262-10874	263-10894
				268-11194	269-11247	270-11267	272-11378	275-11591	276-11644	277-11664	279-11775	284-12000
				284-12017	289-12290	290-12359	292-12443	295-12605	307-13232	307-13265	308-13315	325-14188
				335-14702	355-15779	375-16808	391-17679	399-18132	400-18158	406-18467	411-18694	418-19080
				424-19410	430-19716	430-19751	431-19793	473-21974	496-23217	503-23520	509-23825	

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE	REFERENCES								
WRD.13	= 010660	#96-2646	219-8674	284-12032	380-17132					
WRD.14	= 010664	#96-2647	220-8732	253-10420	284-12033	369-16532	391-17682	440-20302	441-20353	459-21239
		459-21277	528-24797	529-24867	542-25559					
WRD.15	= 010676	#96-2648	300-12839	300-12875	301-12911	302-12948	302-12991			
WRD.16	= 010704	#96-2649	300-12856	307-13234						
WRD.17	= 010712	#96-2650	301-12941	302-12988	460-21304					
WRD.18	= 010724	#96-2651								
WRD.19	= 010730	#96-2652	256-10576	257-10596	257-10612	261-10819	262-10872	262-10888	263-10931	264-10949
		264-10978	268-11192	269-11245	270-11265	270-11304	271-11322	271-11351	271-11372	275-11589
		276-11642	277-11662	277-11701	278-11719	278-11748	279-11773	282-11939	283-11993	284-12014
		284-12034	300-12871	301-12907	306-13193	306-13209	307-13230	307-13263	308-13313	316-13744
		316-13760	317-13780	324-14136	324-14158	325-14186	342-15050	399-18129	400-18155	411-18691
		418-19078	424-19408	430-19714	430-19749	431-19791	435-20027	453-20953	453-20978	454-21001
WRD.2	= 010524	#95-2631	262-10842	262-10859	264-10953	269-11215	269-11232	271-11326	276-11612	276-11629
		278-11723	283-11963	283-11981						
WRD.20	= 010736	#96-2653	272-11380	279-11777	329-14389					
WRD.21	= 010744	#96-2654	329-14371	329-14374	329-14386					
WRD.22	= 010752	#96-2655	355-15781	375-16810	399-18135					
WRD.23	= 010766	#96-2656	399-18131	400-18157	411-18693	430-19719	430-19754	431-19796	435-20029	469-21768
		470-21807								
WRD.24	= 010774	#96-2657	349-15408	349-15428	349-15452	350-15476	350-15496	406-18470	411-18697	479-22309
WRD.25	= 011002	#96-2658	406-18469	411-18696						
WRD.26	= 011016	#96-2659	466-21594							
WRD.27	= 011024	#96-2660	458-21215	460-21307	460-21318	460-21321				
WRD.29	= 011032	#96-2661	458-21213							
WRD.3	= 010536	#95-2632	257-10600	262-10876	269-11249	276-11646	284-12002	306-13214	317-13768	324-14162
WRD.30	= 011046	#96-2662	463-21469	463-21472						
WRD.31	= 011054	#96-2663	459-21240	459-21278						
WRD.32	= 011070	#96-2664	349-15411	349-15431	349-15455	350-15479	350-15499			
WRD.33	= 011076	#96-2665	349-15409	349-15429	349-15453	350-15477	350-15497			
WRD.34	= 011102	#96-2666	349-15413	349-15433	349-15457	350-15481	350-15501			
WRD.35	= 011110	#96-2667	335-14700	342-15052	361-16102	551-25988				
WRD.36	= 011116	#96-2668	342-15051							
WRD.37	= 011122	#96-2669	219-8675	220-8733	243-9912	361-16101	391-17677	393-17800	468-21732	
WRD.38	= 011132	#96-2670	243-9913							
WRD.39	= 011140	#96-2671	393-17802	430-19718	430-19753	431-19795	435-20026			
WRD.4	= 010544	#95-2633	257-10616	263-10896	270-11269	277-11666	284-12019	307-13267	308-13317	317-13784
		325-14190								
WRD.40	= 011150	#96-2672	336-14774	337-14790						
WRD.41	= 011154	#96-2673	447-20685							
WRD.42	= 011170	#96-2674	336-14775	337-14791						
WRD.43	= 011176	#96-2675	262-10840	262-10857	269-11213	269-11230	276-11610	276-11627	283-11961	283-11979
WRD.44	= 011206	#96-2676								
WRD.45	= 011214	#96-2677	335-14701	355-15778						
WRD.46	= 011226	#96-2678	337-14781	337-14793	447-20684					
WRD.47	= 011240	#96-2679	337-14792							
WRD.48	= 011250	#96-2680	374-16802							
WRD.49	= 011260	#96-2681								
WRD.5	= 010552	#95-2634	249-10241	349-15454	350-15478	350-15498	484-22569	488-22811		
WRD.50	= 011270	#96-2682	383-17254	418-19082	424-19412	440-20293	441-20355			
WRD.51	= 011276	#96-2683	337-14780	383-17253						
WRD.52	= 011310	#96-2684	212-8372	224-8950	230-9213	235-9518	289-12287	290-12356	292-12442	528-24813

SYMBOL	VALUE	REFERENCES							
		529-24869	535-25187						
WRD.53	= 011316	#96-2685	250-10296						
WRD.54	= 011326	#96-2686	337-14782						
WRD.55	= 011336	#96-2687	337-14783						
WRD.56	= 011344	#96-2688	224-8949	230-9212	235-9516	289-12286	290-12355	292-12440	381-17142	391-17676
		440-20291							
WRD.57	= 011352	#96-2689							
WRD.58	= 011362	#96-2690							
WRD.59	= 011374	#97-2695	454-21004						
WRD.6	= 010560	#96-2639	250-10265	250-10285	349-15410	349-15430	469-21767	470-21806	
WRD.60	= 011400	#97-2696	440-20292	441-20354					
WRD.61	= 011416	#97-2697	272-11381	279-11778	495-23118	496-23220	503-23523	509-23828	
WRD.62	= 011432	#97-2698	212-8375						
WRD.63	= 011440	#97-2699							
WRD.64	= 011446	#97-2700	479-22310	484-22568	488-22810				
WRD.65	= 011454	#97-2701							
WRD.67	= 011462	#97-2702	496-23216	502-23491	503-23519	509-23824	528-24800	542-25562	
WRD.68	= 011470	#97-2703							
WRD.69	= 011474	#97-2704	528-24798	542-25560					
WRD.7	= 010566	#96-2640	249-10240	250-10264	250-10284	250-10297	468-21733	469-21766	469-21801
WRD.70	= 011502	#97-2705							
WRD.71	= 011514	#97-2706	538-25356						
WRD.72	= 011524	#97-2707	547-25805						
WRD.73	= 011532	#97-2708	479-22308						
WRD.74	= 011540	#97-2709	494-23087	495-23117	496-23189	496-23219	503-23522	509-23827	
WRD.75	= 011552	#97-2710	494-23086	495-23116	496-23188	496-23218	503-23521	509-23826	
WRD.76	= 011562	#97-2711	502-23489	508-23794	515-24172	522-24483			
WRD.77	= 011570	#97-2712	508-23796						
WRD.8	= 010602	#96-2641	250-10283	469-21800	484-22567	488-22809			
WRD.9	= 010616	#96-2642	249-10239	250-10263	399-18133	400-18159	469-21765	502-23488	508-23793	515-24171
		522-24482							
WRT.CH	027156	#196-7584	320-13947	558-26367					
WRT.CS	021712	#135-4563	185-7017	240-9777	241-9809				
WRT.DA	022246	#141-4882	185-7027	241-9787	241-9817				
WRT.DS	025214	#180-6775	186-7071						
WRT.D1	024020	#167-6169	186-7076						
WRT.D2	024332	#171-6361	186-7081						
WRT.D3	024644	#175-6565	186-7086						
WRT.EE	023756	#164-6041	185-7057						
WRT.EL	023714	#161-5904	186-7066						
WRT.ER	022070	#138-4722	185-7022	240-9780	241-9813				
WRT.E1	023010	#150-5361	185-7037	241-9793	241-9825				
WRT.E2	023216	#153-5536	185-7042	241-9796					
WRT.MR	022424	#144-5041	185-7032						
WRT.PA	022602	#147-5199	185-7047	241-9790	241-9821				
WRT.PD	023450	#157-5723	185-7052	446-20605					
WRT.RE	025324	#184-6990	224-8910	229-9169	234-9454	289-12269	290-12338	291-12411	
WRT.TR	027426	#199-7711	317-13805	557-26296					
WT.DAT	015350	#89-2260	*137-4673	137-4677	*140-4833	140-4837	*143-4992	143-4996	*146-5152	146-5156
		*149-5313	149-5317	*152-5475	152-5479	*156-5661	156-5665	*160-5849	160-5853	*163-5989
		163-5991	*166-6124	166-6126	*170-6311	170-6313	*174-6501	174-6503	*179-6714	179-6718
		*182-6874	182-6878	225-8964	230-9223	243-9919	289-12297	291-12370		

ML11 CREATED BY MACRO ON 30-MAR-82 AT 11:24 PAGE 25
SYMBOL CROSS REFERENCE CREF SEQ 0574

SYMBOL	VALUE		REFERENCES								
W.C.SI	015344		#89-2257	*205-8020	*205-8040	439-20254	440-20267	441-20340			
W.ERR	= 005722		#95-2587	199-7728	199-7745						
XOR.LN	021072		#129-4275	399-18104	406-18454						
XSALWA	= 000CC0		#6-13								
XSFALS	= 000040		#3-13								
XSOFFS	= 000400		#6-13								
XSTRUE	= 000020		#6-13								
$END.L	113564	G	#561-26535								
$PATCH	003452	G	#7-338								
$SAVE2	004540	G	32-1022	37-1269	#39-1344	112-3476	125-4048	135-4563	137-4661	138-4722	140-4821
			141-4882	143-4980	144-5041	146-5140	147-5199	149-5300	150-5361	152-5462	153-5536
			156-5647	157-5723	160-5835	167-6169	169-6283	171-6361	173-6473	175-6565	178-6685
			182-6862	184-6990	188-7189	209-8183	252-10394	261-10802	268-11175	275-11572	328-14331
			439-20241	472-21937	550-25956	562-26559					
$SAVE3	004554	G	11-169	12-217	16-384	17-438	27-829	28-880	#39-1351	98-2796	110-3368
			203-7927	219-8657	245-10043	249-10221	295-12585	299-12804	306-13179	452-20894	458-21183
			541-25510	546-25737	562-26558						
$SAVE4	004572	G	#39-1359	115-3604	129-4276	216-8504	223-8889	562-26558			
$SAVE5	004612	G	33-1091	37-1269	#39-1368	103-3039	107-3224	212-8334	229-9151	234-9436	240-9764
			288-12248	315-13688	323-14104	333-14602	340-14961	347-15321	354-15681	359-15979	366-16361
			373-16698	379-17029	388-17527	397-18003	404-18353	410-18640	415-18932	422-19295	429-19663
			434-19969	445-20555	477-22198	483-22504	487-22757	493-23033	501-23417	507-23718	513-24035
			520-24369	526-24692	535-25160	556-26267	562-26558				
$T1	030724		#209-8183	210-8250							
$T10	035640		#249-10221	251-10326							
$T11	036302		#252-10394	254-10465							
$T12	036524		#256-10552	257-10646							
$T13	037102		#261-10802	265-11022							
$T14	040244		#268-11175	272-11412							
$T15	041476		#275-11572	279-11809							
$T16	042730		#282-11914	285-12071							
$T17	043572		#288-12248	293-12499							
$T18	045060		#295-12585	296-12648							
$T19	045274		#299-12804	303-13034							
$T2	031150		#212-8334	213-8422							
$T20	046444		#306-13179	309-13357							
$T21	047444		#315-13688	321-13996							
$T22	051212		#323-14104	325-14232							
$T23	051740		#328-14331	330-14425							
$T24	052276		#333-14602	338-14844							
$T25	053472		#340-14961	343-15109							
$T26	054304		#347-15321	351-15547							
$T27	055502		#354-15681	356-15814							
$T28	056260		#359-15979	362-16151							
$T29	057244		#366-16361	370-16565							
$T3	031474		#216-8504	217-8566							
$T30	060356		#373-16698	375-16839							
$T31	061152		#379-17029	383-17290							
$T32	062550		#388-17527	394-17845							
$T33	064306		#397-18003	400-18186							
$T34	065320		#404-18353	407-18529							
$T35	066302		#410-18640	412-18756							

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES	
$T36	066760	#415-18932	419-19143
$T37	070044	#422-19295	425-19464
$T38	070772	#429-19663	432-19858
$T39	072046	#434-19969	436-20082
$T4	031702	#219-8657	221-8774
$T40	072474	#439-20241	442-20394
$T41	073452	#445-20555	448-20744
$T42	074532	#452-20894	454-21036
$T43	075340	#458-21183	461-21353
$T44	076270	#463-21445	464-21507
$T45	076520	#465-21570	466-21619
$T46	076704	#468-21729	470-21844
$T47	077402	#472-21937	473-22005
$T48	077674	#477-22198	480-22368
$T49	100654	#483-22504	485-22635
$T5	032352	#223-8889	225-9012
$T50	101412	#487-22757	489-22866
$T51	102030	#493-23033	497-23267
$T52	103216	#501-23417	504-23573
$T53	104034	#507-23718	510-23878
$T54	104674	#513-24035	516-24224
$T55	105736	#520-24369	523-24531
$T56	106626	#526-24692	530-24906
$T57	107756	#535-25160	539-25402
$T58	111250	#541-25510	543-25606
$T59	111654	#546-25737	548-25850
$T6	033022	#229-9151	231-9280
$T60	112322	#550-25956	552-26053
$T61	112674	#556-26267	559-26427
$T7	033512	#234-9436	237-9600
$T8	034370	#240-9764	244-9975
$T9	035404	#245-10043	247-10115